Windows 7またはAndroid VPNクライアントを使用したASA IKEv2 RA VPNおよび証明書認証の設定

内容

概要

このドキュメントでは、認証方式としてInternet Key Exchange Protocol(IKEv2)と証明書を使用して、Windows 7およびAndroidネイティブ（仮想プライベートネットワーク）VPNクライアントが（リモートアクセス）RA VPN接続を確立できるように、Cisco適応型セキュリティアプライアンス(ASA)バージョン9.7.1以降を設定します。

著者：Cisco TACエンジニア、David RiveraおよびCesar Lopez Zamarripa

前提条件

要件

次の項目に関する知識があることが推奨されます。

- 認証局（CA）
- 公開キー インフラストラクチャ（PKI）
- ASAでのIKEv2によるRA VPN
- Windows 7 組み込み VPN クライアント
- AndroidネイティブVPNクライアント

使用するコンポーネント

このドキュメントの情報は、次のソフトウェアのバージョンに基づいています。

- CISCO1921/K9:IOS CAサーバとしての15.5(3)M4a
- ASA5506X:VPNヘッドエンドとしての9.7(1)
- クライアントマシンとしてのWindows 7
- Galaxy J5 - Android 6.0.1 as mobile client

このドキュメントの情報は、特定のラボ環境にあるデバイスに基づいて作成されました。このドキュメントで使用するすべてのデバイスは、初期（デフォルト）設定の状態から起動しています。本稼働中のネットワークでは、各コマンドによって起こる可能性がある影響を十分確認してください。

設定

概要

ASAヘッドエンドに接続するために、Windows 7およびAndroidネイティブVPNクライアントを設定する手順を次に示します。

認証局の設定

CAを使用すると、証明書に必要な拡張キー使用法(EKU)を埋め込むことができます。ASAヘッドエンドには証明書サーバ認証EKUが必要ですが、クライアント証明書にはクライアント認証EKUが必要です。

次のようなさまざまなCAサーバを使用できます。

- Cisco IOS CA サーバ
- OpenSSL CA サーバ
- Microsoft CA Server
- 3rd パーティCA

この設定例では、IOS CAサーバを使用します。

このセクションでは、バージョン15.5(3)M4aのCISCO1921/K9をCAサーバとして機能させるための基本設定について説明します。

ステップ1：デバイスとバージョンがekuコマンドをサポートしていることを確認します。

```
IOS-CA# show run | section crypto pki
crypto pki server <CA_Server>
  issuer-name <cn=calo_root,ou=TAC,o=cisco>
  grant auto
  eku server-auth client-auth
```

ステップ2：ルータでHTTPサーバを有効にします。

```
IOS-CA(config)#ip http server
```

ステップ3：エクスポート可能なRSAキーペアを生成します。

```
IOS-CA(config)# crypto key generate rsa modulus 2048 label <HeadEnd> exportable
The name for the keys will be: HeadEnd
% The key modulus size is 2048 bits
% Generating 2048 bit RSA keys, keys will be exportable...
[OK] (elapsed time was 5 seconds)
```

ステップ4：トラストポイントを設定します。

```
IOS-CA(config)# crypto pki trustpoint <HeadEnd>
IOS-CA(ca-trustpoint)#enrollment url http://10.201.180.230:80
IOS-CA(ca-trustpoint)#subject-name <cn=HeadEnd.david.com>
IOS-CA(ca-trustpoint)#revocation-check none
IOS-CA(ca-trustpoint)#rsakeypair <HeadEnd>
```

> **注**：enrollmentコマンドのIPアドレスは、到達可能なインターフェイスに対してルータが設定したIPアドレスの1つです。

ステップ5：トラストポイントを認証します（CA証明書の取得）。

```
IOS-CA(config)#crypto pki authenticate <HeadEnd>
Certificate has the following attributes:
       Fingerprint MD5: DA4502F4 CEFB4F08 AAA3179B 70019185
      Fingerprint SHA1: A887F6DB 0656C7E2 857749F3 EA3D7176 8920F52F
% Do you accept this certificate? [yes/no]: yes
Trustpoint CA certificate accepted.
```

ステップ6：トラストポイントを登録します（ID証明書の取得）。

```
IOS-CA(config)#crypto pki enroll <HeadEnd>
%
% Start certificate enrollment ..
% Create a challenge password. You will need to verbally provide this
   password to the CA Administrator in order to revoke your certificate.
   For security reasons your password will not be saved in the configuration.
   Please make a note of it.
Password: cisco123
Re-enter password: cisco123
% The subject name in the certificate will include: cn=HeadEnd.david.com
% The subject name in the certificate will include: Connected_2_INET-B
% Include the router serial number in the subject name? [yes/no]: no
% Include an IP address in the subject name? [no]: no
Request certificate from CA? [yes/no]: yes
% Certificate request sent to Certificate Authority
% The 'show crypto pki certificate verbose HeadEnd' command will show the fingerprint.
*Jul 17 15:21:11.343: CRYPTO_PKI:  Certificate Request Fingerprint MD5: 0017C310 9F6084E8
63053228 B449794F
*Jul 17 15:21:11.343: CRYPTO_PKI:  Certificate Request Fingerprint SHA1: CFE22C7A B2855C4D
B4B2412B 57FC7106 1C5E7791
*Jul 17 15:21:15.675: %PKI-6-CERTRET: Certificate received from Certificate Authority
```

ステップ7：証明書を確認します。

```
IOS-CA#show crypto pki certificates verbose <HeadEnd>
Certificate
  Status: Available
  Version: 3
  Certificate Serial Number (hex): 05
  Certificate Usage: General Purpose
  Issuer:
    cn=calo_root
  Subject:
    Name: Connected_2_INET-B
    hostname=Connected_2_INET-B
    cn=HeadEnd.david.com
  Validity Date:
    start date: 16:56:14 UTC Jul 16 2017
    end   date: 16:56:14 UTC Jul 16 2018
  Subject Key Info:
    Public Key Algorithm: rsaEncryption
    RSA Public Key: (2048 bit)
  Signature Algorithm: SHA1 with RSA Encryption
  Fingerprint MD5: 0017C310 9F6084E8 63053228 B449794F
  Fingerprint SHA1: CFE22C7A B2855C4D B4B2412B 57FC7106 1C5E7791
  X509v3 extensions:
    X509v3 Key Usage: A0000000
      Digital Signature
      Key Encipherment
    X509v3 Subject Key ID: E9B3A080 779A76E7 8BE44F38 C3E4DEDF 18E75009
    X509v3 Authority Key ID: B5EEEEB9 31B9A06C CBD9893C 0E318810 5CA657E6
   Authority Info Access:
    Extended Key Usage:
        Client Auth
        Server Auth
  Associated Trustpoints: HeadEnd
  Key Label: HeadEnd

CA Certificate
  Status: Available
  Version: 3
  Certificate Serial Number (hex): 01
  Certificate Usage: Signature
  Issuer:
    cn=calo_root
  Subject:
    cn=calo_root
  Validity Date:
    start date: 13:24:35 UTC Jul 13 2017
    end   date: 13:24:35 UTC Jul 12 2020
  Subject Key Info:
    Public Key Algorithm: rsaEncryption
    RSA Public Key: (1024 bit)
  Signature Algorithm: MD5 with RSA Encryption
  Fingerprint MD5: DA4502F4 CEFB4F08 AAA3179B 70019185
  Fingerprint SHA1: A887F6DB 0656C7E2 857749F3 EA3D7176 8920F52F
  X509v3 extensions:
    X509v3 Key Usage: 86000000
      Digital Signature
      Key Cert Sign
      CRL Signature
    X509v3 Subject Key ID: B5EEEEB9 31B9A06C CBD9893C 0E318810 5CA657E6
    X509v3 Basic Constraints:
        CA: TRUE
    X509v3 Authority Key ID: B5EEEEB9 31B9A06C CBD9893C 0E318810 5CA657E6
    Authority Info Access:
  Associated Trustpoints: test HeadEnd CA_Server
```

ステップ8:PKCS12形式でHeadEndトラストポイントを端末にエクスポートし、ID証明書を取得します。CA証明書と秘密キーが1つのファイルに追加されます。

```
IOS-CA(config)#crypto pki export
```

```
          <cisco123>
Exported pkcs12 follows:
```

```
MIIL3wIBAzCCC5kGCSqGSIb3DQEHAaCCC4oEgguGMIILgjCCC34GCSqGSIb3DQEH
BqCCC28wggtrAgEAMIILZAYJKoZIhvcNAQcBMBsGCiqGSIb3DQEMAQMwDQQIocGz
Fa6tZyACAQGAggs4qNTJi7l/f0IvQr8n1c/SCeaSYRLBvcY9yPgJ2K2/Nmu9+KNB
3dAoYkCrGwDdfpobJE0XqBpIE1uBOtAeF7zdFJt/Pgpie4fcqpCVIbDXG8Ansmhj
v0j6W9Z/IJHe7JrENatbi4nhTnCDP79Z65QSkzrb9DenkCGjoQsWP9zLHTiCDNzV
ajMlWFuCFb0wSW/6L73BLTjS7rwtE74gYMU5NJwtOVsJM2LdwuQ+iOnpsnp6q9fu
niUFEutPe8imOCRApe0tpPqhDp74hKziKT8JEsQ8HMO/lX1y/LIXdLISnz1nkoN3
vxD4AMGRFYACPH8PiGcVSx+vD+wmNaHp1vAOrq4pS7ZQ37ko4mFudnftdOUzaPIz
EzTrOwlRE6il/gF8vb14EfeR09vumJBsajF12hrFGugIJTZnElp5go+oHEEAo4Y+
Yhoj/MIOyhZzo3/ujhjKqtsAJXybYF9YqVkTee9u4Xjkcsg5AmbaqeUUfd7Q8CC2
bi39S1maoWbTYiNcHFs/bWKWJsgZwPzfWtmPch/8MNvXn46AJAwIwRQjHruuFE9F
bhv7SRhYSRQZPf7j1PTmJuMkKA3AzjdbmmJuLidbX3yKbTt4PxPMusbv+ojc6Nam
RCsRf7+gnNZLWs3eU1n84rryZg5Pjw3MRTu2yXDvr799gvx7NIZH5yUZyVl1T70b
eC4KbflcmpM6mJ2UVnaoP2N5u892m41BWuk9rt5isl2f/Z/ZuSbkFaxzU0456zSg
VbYsR+51XfQEH5xu88E5EUPWZ86YdUSlbD8ky6WOn0M1O4K6rNDLkgwXcxw3CaZ8
zhao+dE3qoEYWaKPgCQzPqW0BW3y7WSIELug2uSEsXQjIQcF+42CX6RA3yCmy2T8
C+osKlSSao0nzjrlpTWnPiFss9KRFgJDZhV2ItisiALNw9PqruddcmYtw44LXvdc
+OfnyRvuLS6LE/AMmGk0GaVetAXPezD+5pVZW13UMT/ZdzUjLiXjV9GzF6V8i8qN
Ua0MbDEa8T5Le4dCigaA+t1QxQOPGb+w0ZAQzWN4gZpSEk3ejRixOt14SU5ivj/O
lGXNn8Fvebk42CHohjXG9fq/IfbsVWSkxn2OZ/fhXkZztv4ic1VgprgJURjCtcBw
9Qp/ONda+9aDHiSBrKeHC/urgX6rgWXv9+hpRKIRfj3b8WE+N1sivuQEjlWxbD7h
9fpwxXb+/i7HisjzSkOWUNw4lyulfYSiOv86FPWK0H9Vjbg0G0di1rvGZ8uJHQCC
77RLFXp4jrvCgeo4oWKQbphgPAng7rT794vMwq0rYOb4D3HlHCUvU3JJmScDJQy2
zQxbG2q8Htm44COOuJEUBzx1ImayH2XvDck6VmLTGn8XH5Vq7LOlCeUcVDM8aQfy
HJSPk/VmfQ0lXwPIaxxYlr+jOpcorFkH+OH04hz07grAsGyLRoFICTEvHAzVnF0X
2A1j/z/BFAPG86ssAtInRZVeYUS72NwPEtpKmlHZnl+2iWno5iwTZgtjv7oREZKE
RE6m7O8RiPSD2RjjamCmmmnH5dK5wxF7YlIeK/+ZVrfwLecEPRl+eVw0isM/JN/a
WmkZkCcVMx/ec1P8jp8LzCx17HgVNYbg9lsiffD4xo0G/k0QLUlpliAt7LA2BeGs
yl55wtYUcOBH0/Es39yWnm2Ea//IK6BLw98PvU90vkXWwiD3ajFmcHmssDeU/tZR
4KKNuNor7Le9ycXZFM9ofKZ6AIJ9A1AYvOyhGO88voq8MMGXEe/q+DIjaVE1htYu
k0ELmYAD/XOkEvp3SqOkLQZiCzZ20iMWUTWXlXfgrfLEH0utwHTyr3J2vQk5CD37
ZAfsF6zxEvtU2t41J0e9OjWJw9WtWnnS0gzLeXWtW3H0YAIw3QodKNzbaY4eLP4y
BEdsLmWbM4eza0m9BoZOmMUSkhvFrEz5Q5X5r9vCuAi1rYDqyIjhgdme56tVV0Vg
ZauhbNX59PQQzwOdIZJVVL5tgjf0h7XCm9OBsqd12lHurCCmHy7kM5pqf0MMlhH7
oM/DhXdTU+1sEabt/9c2qs1ihJLS1Zaw2q1AaS5h00+xL8Lxwh2/1/R7Q8FferhR
QZDpix+CmtakRu7uPOMa0zsyOko3P9mf74AWDrThAwMA6G238TC6XI1vrXhvEX1l
BVplQq0Wh/p7ZorSjD5l+z7TkXmJNp7iIxAqp0yobC6vOBwQP7/QAs88q9JNSAte
ErdCXoizvs8YmZMoEap948oplYFaIP+xCnCr8l3v7znwfZwTMQPoPvqEFqUmWYgt
xkJ0qaE645ihTnLgk4eglsBLslwPR1RJU+t6kGGAUmxqhPFxb3/1xNRPVzOGn12w
S9yw+XLC6kS4PmKoxkxax4nnCx7s3e7B5e0qmYtgRTJ0GuW7Uf+T3royTOuYm0d+
ik6bmxcnO0qdcHtt2HTbI+kYpken3YrFOh9Jnm9ZKT63gQSqQWL800ZVd4dAZceg
FciNKs9r26fyy+L3rGCh+U9TLf6mNuWu8RstjjIGPHEPKZ9gnMgMJmikP2ghgOAd
XVhs6ashXx33bZ9dIuhRx6uTNMrppsXyg6SxUyeGDYhpxsPt7uRwBswOpi6iDMZn
ISSzQjrkxoNwwOfn87O5fTCLhHlTZa8HS5HMK3KE7LiZv9pa1z6KTo4z+LCQSLDy
FoRJhSaEsCYJsLDS5nYBoR8hE/eMvQDX1f+RZBrJDcftxx7FQ+8RtvHSJRcJK9N/
Ph/pL62NBlSbvCfn1AbisKrbbgCVLOSj/doufPvpMT2UDL0TY8UnQiyWMH1MF3tZ
jJy6Si2glLwA9hu/c1NsREbA0gxMTjAREb5BjAUmlc3fuv2DWpwnkwyZNyHdm9B9
TPRoByGPvSZXa8MwY/8DUEwUQEsfDJi5jlAD4I6VFFUB72ZS7wn/mVR02fPkfOMp
3yhnGgX29OaDDiDlKw1Xwj1NybOhpZ6unDo5J3stMxlbv5TYL2Tl6egZS0SjsLmn
cj5zkyUU22/93E5vfKD1CMiXx9/e4j2rRh3QCIXqaCjC9acTJ8a/k9/bp8Nz5Cir
pnaCbuQsvna92nxVUqcmLlSbVIvGqlH9qm4DurhcLh59j20tX6K8AMJ90+azaYbX
AJV/MCElhJg6wcN8QnCHMhiuK9+zpsUK2FQgfbcgaaNe3xGaXuoOIGQmlbAGtEkp
kuauRzQ8/pwszaZuPh/5rE77z8zMut3+OE5CslB9npzNi0b0itaaRl13bBBml1xn
r6SBUw7AWapZwRx6pihvptLJaqU1IzaV5SWk0zTABR7BmR84L0+/8v/bedcPSioG
ecside21F6CcWO5ywABBxDYQXM1P9qkC/2bkPkEJ0jBI5P5L1+Yqb8hTlone/InR
B8ktEd8+QW8o60h0seONXumTqBfAuNBkprOA3ssXLeEGB0IpeC5oGW+VSziyS9id
zYq8WaehpAIf3pqwn8gsi0B/wd57T0KK91+v0Ei4z+yIdu8Kh9GTiqGvgNAeakgr
ECDiXoKAwltYAn7cLKNpZaojSs2Jt+60oBA5crT04Mtgpjb9Pd/DLqWQDJTyoRVv
cJRb68aOyZvVBU0yoLbox84QKLHIsA92pplS7VFrAWP65wrhs4XOf4YSFlM89Sn4
```

```
GD/yEsGVJzwGrxgCNnOZkLIKsFbIOjp2lMps5jVKoFfpPJCie3F2FB3ecS+xRpHo
5u2KOTmH0rFQ6Vu+JYCo/qWh0ERtL/8gczP7C9ehiaZfemw2bq9xrUo+6y3H9Q+Z
LADwMlAkI+kzbng3R+fj4AYBvf8GTJdpBs8s/t7mZXHiXCtH6qxTMRWJx5Xuxs9F
I8Ii8TA9MCEwCQYFKw4DAhoFAAQUjO/On/REYODupznP9SwYnFX92BYEFESx1MSa
ho3Cv1cZYM0TzZEzlsKdAgIEAA==
---End - This line not part of the pkcs12---

CRYPTO_PKI: Exported PKCS12 file successfully.
*Jul 17 15:46:49.706: %PKI-6-PKCS12EXPORT_SUCCESS: PKCS #12 Successfully Exported.
```

ステップ9:ASAで空のトラストポイントを作成します。

```
ASA(config)# crypto ca trustpoint <HeadEnd>
DRIVERAP(config-ca-trustpoint)# exit
```

ステップ 10：PKCS12ファイルをインポートします。

```
ASA(config)#crypto ca import <HeadEnd> pkcs12 <cisco123>
Enter the base 64 encoded pkcs12.
End with the word "quit" on a line by itself:
MIIL3wIBAzCCC5kGCSqGSIb3DQEHAaCCC4oEgguGMIILgjCCC34GCSqGSIb3DQEH
BqCCC28wggtrAgEAMIILZAYJKoZIhvcNAQcBMBsGCiqGSIb3DQEMAQMwDQQIocGz
Fa6tZyACAQGAggs4qNTJi7l/f0IvQr8n1c/SCeaSYRLBvcY9yPgJ2K2/Nmu9+KNB
3dAoYkCrGwDdfpobJE0XqBpIE1uBOtAeF7zdFJt/Pgpie4fcqpCVIbDXG8Ansmhj
v0j6W9Z/IJHe7JrENatbi4nhTnCDP79Z65QSkzrb9DenkCGjoQsWP9zLHTiCDNzV
ajMlWFuCFb0wSW/6L73BLTjS7rwtE74gYMU5NJwtOVsJM2LdwuQ+iOnpsnp6q9fu
niUFEutPe8imOCRApe0tpPqhDp74hKziKT8JEsQ8HMO/lX1y/LIXdLISnz1nkoN3
vxD4AMGRFYACPH8PiGcVSx+vD+wmNaHp1vAOrq4pS7ZQ37ko4mFudnftdOUzaPIz
EzTrOwlRE6il/gF8vb14EfeR09vumJBsajF12hrFGugIJTZnElp5go+oHEEAo4Y+
Yhoj/MIOyhZzo3/ujhjKqtsAJXybYF9YqVkTee9u4Xjkcsg5AmbaqeUUfd7Q8CC2
bi39S1maoWbTYiNcHFs/bWKWJsgZwPzfWtmPch/8MNvXn46AJAwIwRQjHruuFE9F
bhv7SRhYSRQZPf7j1PTmJuMkKA3AzjdbmmJuLidbX3yKbTt4PxPMusbv+ojc6Nam
RCsRf7+gnNZLWs3eU1n84rryZg5Pjw3MRTu2yXDvr799gvx7NIZH5yUZyVl1T70b
eC4KbflcmpM6mJ2UVnaoP2N5u892m41BWuk9rt5isl2f/Z/ZuSbkFaxzU0456zSg
VbYsR+51XfQEH5xu88E5EUPWZ86YdUSlbD8ky6WOn0M1O4K6rNDLkgwXcxw3CaZ8
zhao+dE3qoEYWaKPgCQzPqW0BW3y7WSIELug2uSEsXQjIQcF+42CX6RA3yCmy2T8
C+osKlSSao0nzjrlpTWnPiFss9KRFgJDZhV2ItisiALNw9PqruddcmYtw44LXvdc
+OfnyRvuLS6LE/AMmGk0GaVetAXPezD+5pVZW13UMT/ZdzUjLiXjV9GzF6V8i8qN
Ua0MbDEa8T5Le4dCigaA+t1QxQOPGb+w0ZAQzWN4gZpSEk3ejRixOt14SU5ivj/O
lGXNn8Fvebk42CHohjXG9fq/IfbsVWSkxn2OZ/fhXkZztv4ic1VgprgJURjCtcBw
9Qp/ONda+9aDHiSBrKeHC/urgX6rgWXv9+hpRKIRfj3b8WE+N1sivuQEjlWxbD7h
9fpwxXb+/i7HisjzSkOWUNw4lyulfYSiOv86FPWK0H9Vjbg0G0di1rvGZ8uJHQCC
77RLFXp4jrvCgeo4oWKQbphgPAng7rT794vMwq0rYOb4D3HlHCUvU3JJmScDJQy2
zQxbG2q8Htm44COOuJEUBzx1ImayH2XvDck6VmLTGn8XH5Vq7LOlCeUcVDM8aQfy
HJSPk/VmfQ0lXwPIaxxYlr+jOpcorFkH+OH04hz07grAsGyLRoFICTEvHAzVnF0X
2A1j/z/BFAPG86ssAtInRZVeYUS72NwPEtpKmlHZnl+2iWno5iwTZgtjv7oREZKE
RE6m7O8RiPSD2RjjamCmmmnH5dK5wxF7YlIeK/+ZVrfwLecEPRl+eVw0isM/JN/a
WmkZkCcVMx/ec1P8jp8LzCx17HgVNYbg9lsiffD4xo0G/k0QLUlpliAt7LA2BeGs
yl55wtYUcOBH0/Es39yWnm2Ea//IK6BLw98PvU90vkXWwiD3ajFmcHmssDeU/tZR
4KKNuNor7Le9ycXZFM9ofKZ6AIJ9A1AYvOyhGO88voq8MMGXEe/q+DIjaVE1htYu
k0ELmYAD/XOkEvp3SqOkLQZiCzZ20iMWUTWXlXfgrfLEH0utwHTyr3J2vQk5CD37
ZAfsF6zxEvtU2t41J0e9OjWJw9WtWnnS0gzLeXWtW3H0YAIw3QodKNzbaY4eLP4y
BEdsLmWbM4eza0m9BoZOmMUSkhvFrEz5Q5X5r9vCuAi1rYDqyIjhgdme56tVV0Vg
ZauhbNX59PQQzwOdIZJVVL5tgjf0h7XCm9OBsqd12lHurCCmHy7kM5pqf0MMlhH7
oM/DhXdTU+1sEabt/9c2qs1ihJLS1Zaw2q1AaS5h00+xL8Lxwh2/1/R7Q8FferhR
QZDpix+CmtakRu7uPOMa0zsyOko3P9mf74AWDrThAwMA6G238TC6XI1vrXhvEX1l
BVplQq0Wh/p7ZorSjD5l+z7TkXmJNp7iIxAqp0yobC6vOBwQP7/QAs88q9JNSAte
ErdCXoizvs8YmZMoEap948oplYFaIP+xCnCr8l3v7znwfZwTMQPoPvqEFqUmWYgt
xkJ0qaE645ihTnLgk4eglsBLslwPR1RJU+t6kGGAUmxqhPFxb3/1xNRPVzOGn12w
S9yw+XLC6kS4PmKoxkxax4nnCx7s3e7B5e0qmYtgRTJ0GuW7Uf+T3royTOuYm0d+
ik6bmxcnO0qdcHtt2HTbI+kYpken3YrFOh9Jnm9ZKT63gQSqQWL800ZVd4dAZceg
FciNKs9r26fyy+L3rGCh+U9TLf6mNuWu8RstjjIGPHEPKZ9gnMgMJmikP2ghgOAd
```

```
XVhs6ashXx33bZ9dIuhRx6uTNMrppsXyg6SxUyeGDYhpxsPt7uRwBswOpi6iDMZn
ISSzQjrkxoNwwOfn87O5fTCLhHlTZa8HS5HMK3KE7LiZv9pa1z6KTo4z+LCQSLDy
FoRJhSaEsCYJsLDS5nYBoR8hE/eMvQDX1f+RZBrJDcftxx7FQ+8RtvHSJRcJK9N/
Ph/pL62NBlSbvCfn1AbisKrbbgCVLOSj/doufPvpMT2UDL0TY8UnQiyWMH1MF3tZ
jJy6Si2glLwA9hu/c1NsREbA0gxMTjAREb5BjAUmlc3fuv2DWpwnkwyZNyHdm9B9
TPRoByGPvSZXa8MwY/8DUEwUQEsfDJi5jlAD4I6VFFUB72ZS7wn/mVR02fPkfOMp
3yhnGgX29OaDDiDlKw1Xwj1NybOhpZ6unDo5J3stMxlbv5TYL2Tl6egZS0SjsLmn
cj5zkyUU22/93E5vfKD1CMiXx9/e4j2rRh3QCIXqaCjC9acTJ8a/k9/bp8Nz5Cir
pnaCbuQsvna92nxVUqcmLlSbVIvGqlH9qm4DurhcLh59j20tX6K8AMJ90+azaYbX
AJV/MCElhJg6wcN8QnCHMhiuK9+zpsUK2FQgfbcgaaNe3xGaXuoOIGQmlbAGtEkp
kuauRzQ8/pwszaZuPh/5rE77z8zMut3+OE5CslB9npzNi0b0itaaRl13bBBml1xn
r6SBUw7AWapZwRx6pihvptLJaqU1IzaV5SWk0zTABR7BmR84L0+/8v/bedcPSioG
ecside21F6CcWO5ywABBxDYQXM1P9qkC/2bkPkEJ0jBI5P5L1+Yqb8hTlone/InR
B8ktEd8+QW8o60h0seONXumTqBfAuNBkprOA3ssXLeEGB0IpeC5oGW+VSziyS9id
zYq8WaehpAIf3pqwn8gsi0B/wd57T0KK91+v0Ei4z+yIdu8Kh9GTiqGvgNAeakgr
ECDiXoKAwltYAn7cLKNpZaojSs2Jt+60oBA5crT04Mtgpjb9Pd/DLqWQDJTyoRVv
cJRb68aOyZvVBU0yoLbox84QKLHIsA92pplS7VFrAWP65wrhs4XOf4YSFlM89Sn4
GD/yEsGVJzwGrxgCNnOZkLIKsFbIOjp2lMps5jVKoFfpPJCie3F2FB3ecS+xRpHo
5u2KOTmH0rFQ6Vu+JYCo/qWh0ERtL/8gczP7C9ehiaZfemw2bq9xrUo+6y3H9Q+Z
LADwMlAkI+kzbng3R+fj4AYBvf8GTJdpBs8s/t7mZXHiXCtH6qxTMRWJx5Xuxs9F
I8Ii8TA9MCEwCQYFKw4DAhoFAAQUjO/On/REYODupznP9SwYnFX92BYEFESx1MSa
ho3Cv1cZYM0TzZEzlsKdAgIEAA==
```

```
quit
INFO: Import PKCS12 operation completed successfully
```

ステップ11：証明書情報を確認します。

```
ASA(config)#show crypto ca certificates <HeadEnd>
CA Certificate
  Status: Available
  Certificate Serial Number: 01
  Certificate Usage: Signature
  Public Key Type: RSA (1024 bits)
  Signature Algorithm: MD5 with RSA Encryption
  Issuer Name:
    cn=calo_root
  Subject Name:
    cn=calo_root
  Validity Date:
    start date: 13:24:35 UTC Jul 13 2017
    end   date: 13:24:35 UTC Jul 12 2020
  Storage: config
  Associated Trustpoints: test HeadEnd
Certificate
  Status: Available
  Certificate Serial Number: 05
  Certificate Usage: General Purpose
  Public Key Type: RSA (2048 bits)
  Signature Algorithm: SHA1 with RSA Encryption
  Issuer Name:
    cn=calo_root
  Subject Name:
    hostname=Connected_2_INET-B
    cn=HeadEnd.david.com
  Validity Date:
    start date: 16:56:14 UTC Jul 16 2017
    end   date: 16:56:14 UTC Jul 16 2018
  Storage: config
  Associated Trustpoints: HeadEnd
```

クライアント証明書の生成

ステップ1：エクスポート可能なRSAキーペアを生成します。

```
IOS-CA(config)# crypto key generate rsa modulus 2048 label <Win7_PC> exportable
The name for the keys will be: Win7_PC
% The key modulus size is 2048 bits
% Generating 2048 bit RSA keys, keys will be exportable...
[OK] (elapsed time was 5 seconds
```

ステップ2：トラストポイントを設定します。

```
IOS-CA(config)# crypto pki trustpoint <Win7_PC>
IOS-CA(ca-trustpoint)#enrollment url http://10.201.180.230:80
IOS-CA(ca-trustpoint)#subject-name <cn=Win7_PC.david.com>
IOS-CA(ca-trustpoint)#revocation-check none
IOS-CA(ca-trustpoint)#rsakeypair <Win7_PC>
```

ステップ3：設定されたトラストポイントを認証します（CA証明書の取得）。

```
IOS-CA(config)#crypto pki authenticate <Win7_PC>
Certificate has the following attributes:
       Fingerprint MD5: DA4502F4 CEFB4F08 AAA3179B 70019185
      Fingerprint SHA1: A887F6DB 0656C7E2 857749F3 EA3D7176 8920F52F
% Do you accept this certificate? [yes/no]: yes
Trustpoint CA certificate accepted.
```

ステップ4：認証されたトラストポイントを登録します（ID証明書の取得）。

```
IOS-CA(config)#crypto pki enroll <Win7_PC>
%
% Start certificate enrollment ..
% Create a challenge password. You will need to verbally provide this
   password to the CA Administrator in order to revoke your certificate.
   For security reasons your password will not be saved in the configuration.
   Please make a note of it.
Password: cisco123
Re-enter password: cisco123
% The subject name in the certificate will include: cn=Win7_PC.david.com
% The subject name in the certificate will include: Connected_2_INET-B
% Include the router serial number in the subject name? [yes/no]: no
% Include an IP address in the subject name? [no]: no
Request certificate from CA? [yes/no]: yes
% Certificate request sent to Certificate Authority
% The 'show crypto pki certificate verbose Win7_PC' command will show the fingerprint.
*Jul 17 15:21:11.343: CRYPTO_PKI:  Certificate Request Fingerprint MD5: 9153E537 11C16FAE
B03F7A38 775DBB92
*Jul 17 15:21:11.343: CRYPTO_PKI:  Certificate Request Fingerprint SHA1: 3BC4AC98 91067707
BB6BBBFB ABD97796 F7FB3DD1
*Jul 17 15:21:15.675: %PKI-6-CERTRET: Certificate received from Certificate Authority
```

ステップ5：証明書情報を確認します。

```
IOS-CA#show crypto pki certificates verbose <Win7_PC>
Certificate
  Status: Available
  Version: 3
  Certificate Serial Number (hex): 03
  Certificate Usage: General Purpose
  Issuer:
    cn=calo_root
  Subject:
    Name: Connected_2_INET-B
    hostname=Connected_2_INET-B
    cn=Win7_PC.david.com
  Validity Date:
    start date: 13:29:51 UTC Jul 13 2017
    end   date: 13:29:51 UTC Jul 13 2018
  Subject Key Info:
    Public Key Algorithm: rsaEncryption
    RSA Public Key: (2048 bit)
  Signature Algorithm: SHA1 with RSA Encryption
  Fingerprint MD5: 9153E537 11C16FAE B03F7A38 775DBB92
  Fingerprint SHA1: 3BC4AC98 91067707 BB6BBBFB ABD97796 F7FB3DD1
  X509v3 extensions:
    X509v3 Key Usage: A0000000
      Digital Signature
      Key Encipherment
    X509v3 Subject Key ID: F37266AE 61F64BD9 3E9FA80C 77455F21 5BEB870D
    X509v3 Authority Key ID: B5EEEEB9 31B9A06C CBD9893C 0E318810 5CA657E6
    Authority Info Access:
    Extended Key Usage:
        Client Auth
        Server Auth
  Associated Trustpoints: Win7_PC
  Key Label: Win7_PC
CA Certificate
  Status: Available
  Version: 3
  Certificate Serial Number (hex): 01
  Certificate Usage: Signature
  Issuer:
    cn=calo_root
  Subject:
    cn=calo_root
  Validity Date:
    start date: 13:24:35 UTC Jul 13 2017
    end   date: 13:24:35 UTC Jul 12 2020
  Subject Key Info:
    Public Key Algorithm: rsaEncryption
    RSA Public Key: (1024 bit)
  Signature Algorithm: MD5 with RSA Encryption
  Fingerprint MD5: DA4502F4 CEFB4F08 AAA3179B 70019185
  Fingerprint SHA1: A887F6DB 0656C7E2 857749F3 EA3D7176 8920F52F
  X509v3 extensions:
    X509v3 Key Usage: 86000000
      Digital Signature
      Key Cert Sign
      CRL Signature
    X509v3 Subject Key ID: B5EEEEB9 31B9A06C CBD9893C 0E318810 5CA657E6
    X509v3 Basic Constraints:
        CA: TRUE
    X509v3 Authority Key ID: B5EEEEB9 31B9A06C CBD9893C 0E318810 5CA657E6
    Authority Info Access:
  Associated Trustpoints: test HeadEnd Win7_PC CA_Server
```

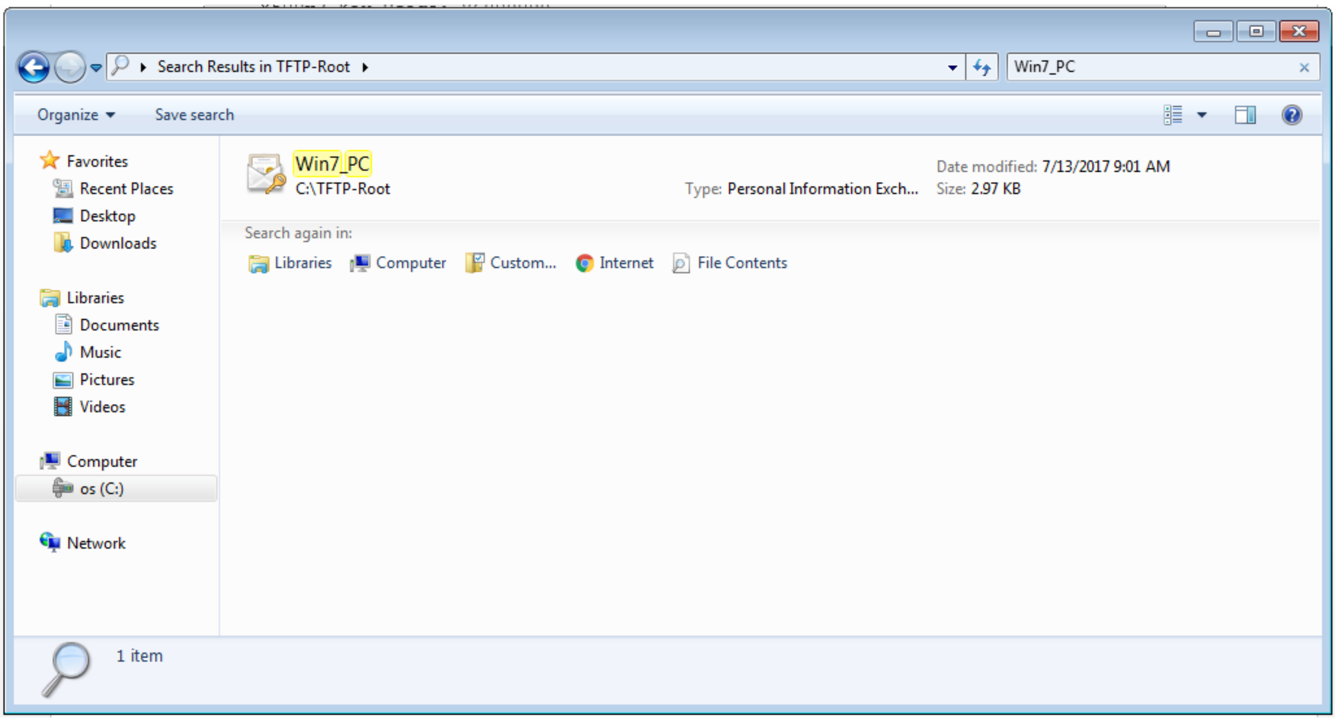
Windows 7クライアントマシンへのID証明書のインストール

ステップ1：名前付きWin7_PCトラストポイントをPKCS12形式(.p12)でFTP/TFTPサーバ（Windows 7マシンにインストール）にエクスポートし、ID証明書、CA証明書、および秘密キーを1つのファイルで取得します。

```
IOS-CA(config)#crypto pki export <Win7_PC> pkcs12 <tftp://10.152.206.175/ Win7_PC.p12> password
<cisco123>
Address or name of remote host [10.152.206.175]?
Destination filename [Win7_PC.p12]?
```

```
!Writing pkcs12 file to tftp://10.152.206.175/Win7_PC.p12
!
CRYPTO_PKI: Exported PKCS12 file successfully.
*Jul 17 16:29:20.310: %PKI-6-PKCS12EXPORT_SUCCESS: PKCS #12 Successfully Exported.
```

これは、エクスポートされたファイルがクライアントマシンでどのように見えるかを示しています。



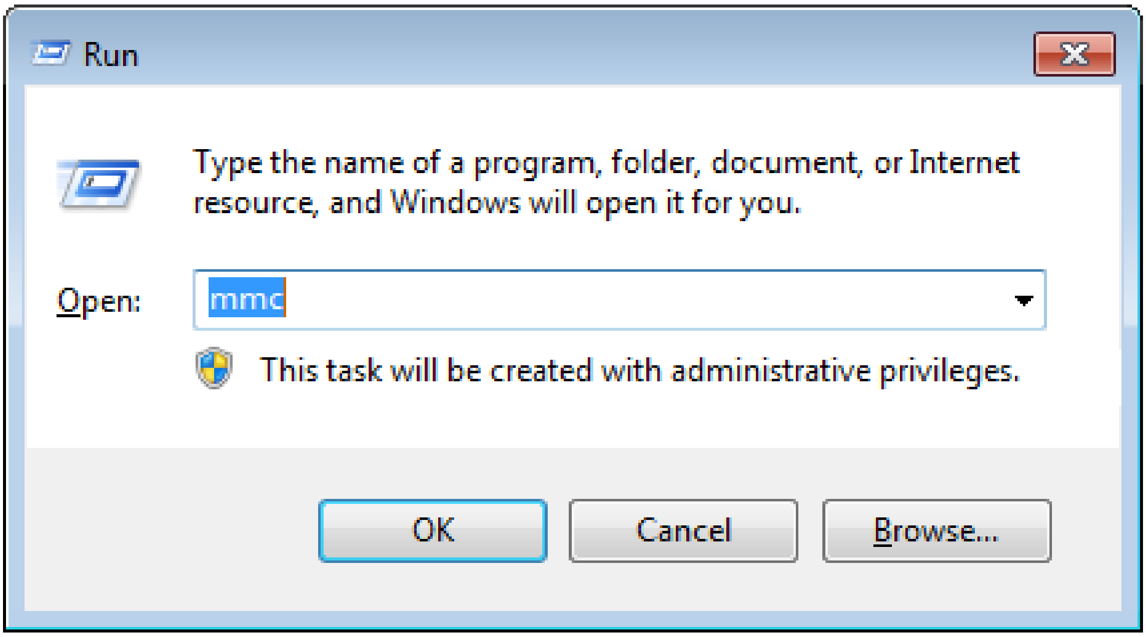
Search Results in TFTP-Root

Win7_PC

Win7_PC
C:\TFTP-Root
Type: Personal Information Exch...
Date modified: 7/13/2017 9:01 AM
Size: 2.97 KB

1 item

ステップ2:**Ctrl + Rキーを押**し、mmc**と入力**して、Microsoft管理コンソール(MMC)を開きます。



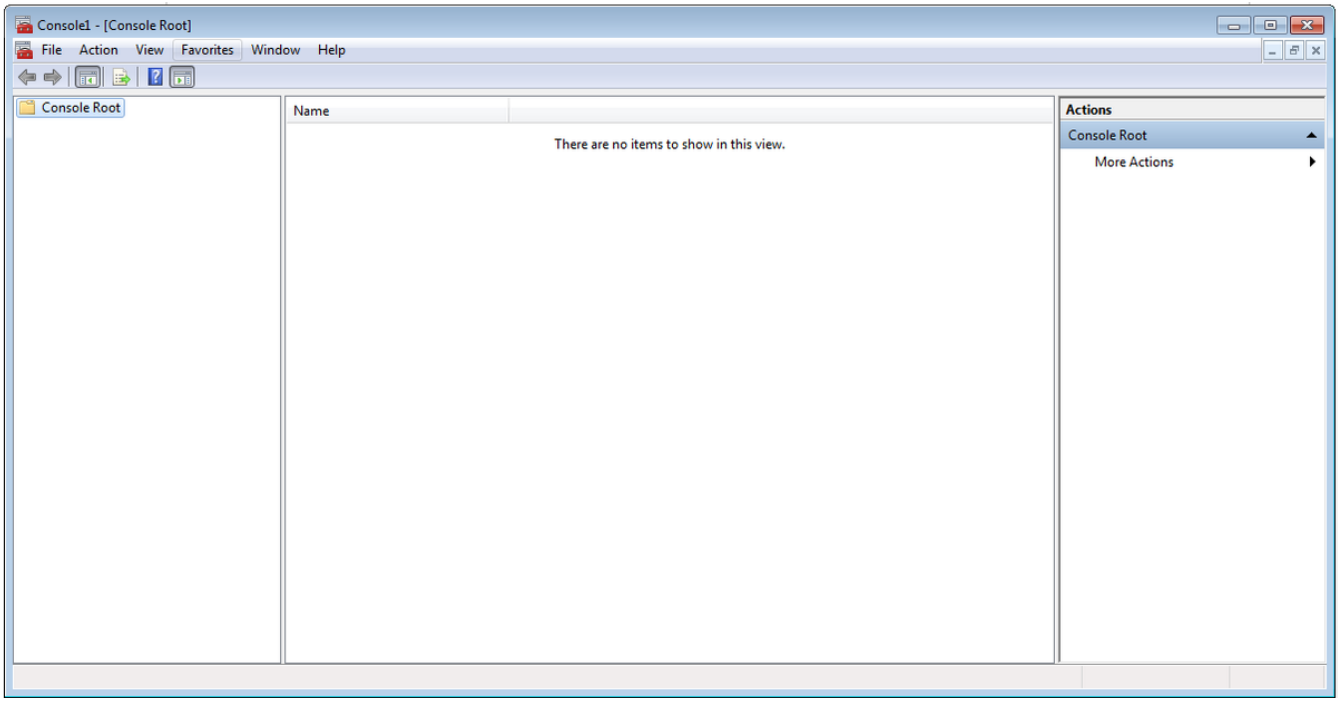
Run

Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.

Open: mmc

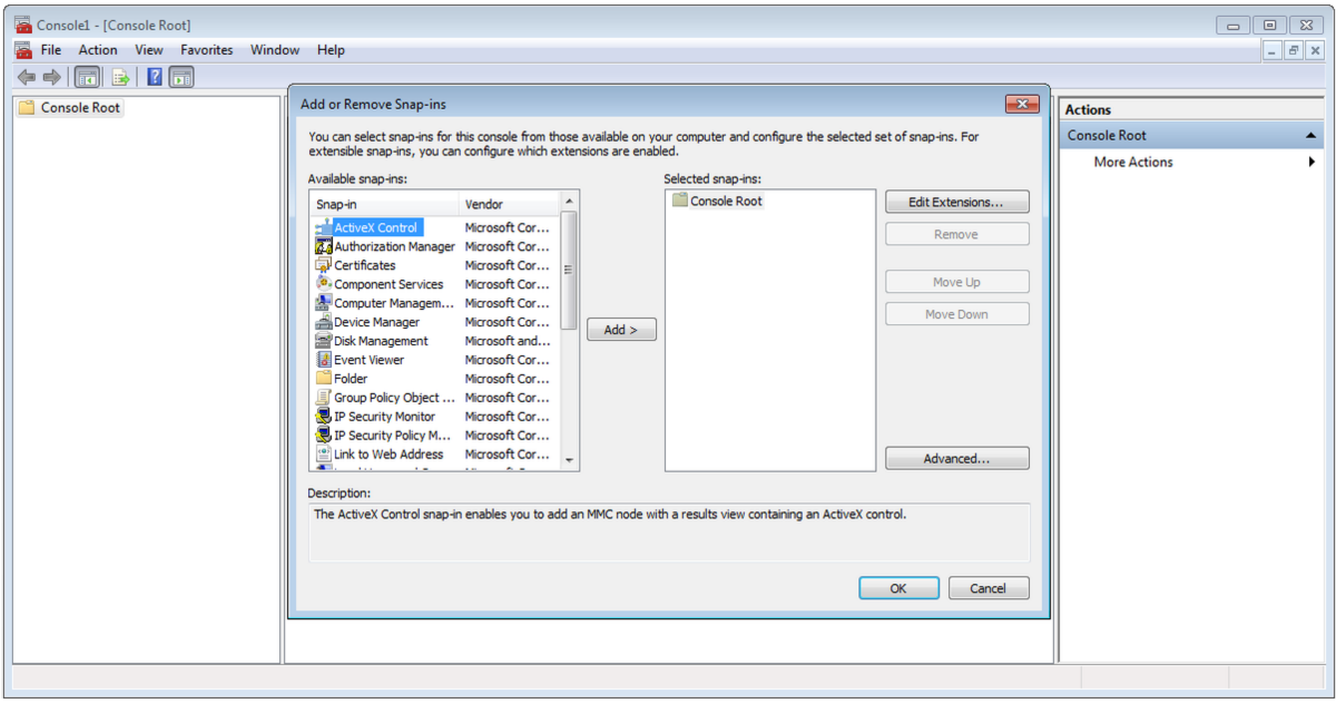
This task will be created with administrative privileges.

ステップ 3：[OK] を選択します。



There are no items to show in this view.

ステップ4:[File] > [Add/Remove Snap-in]に移動します。

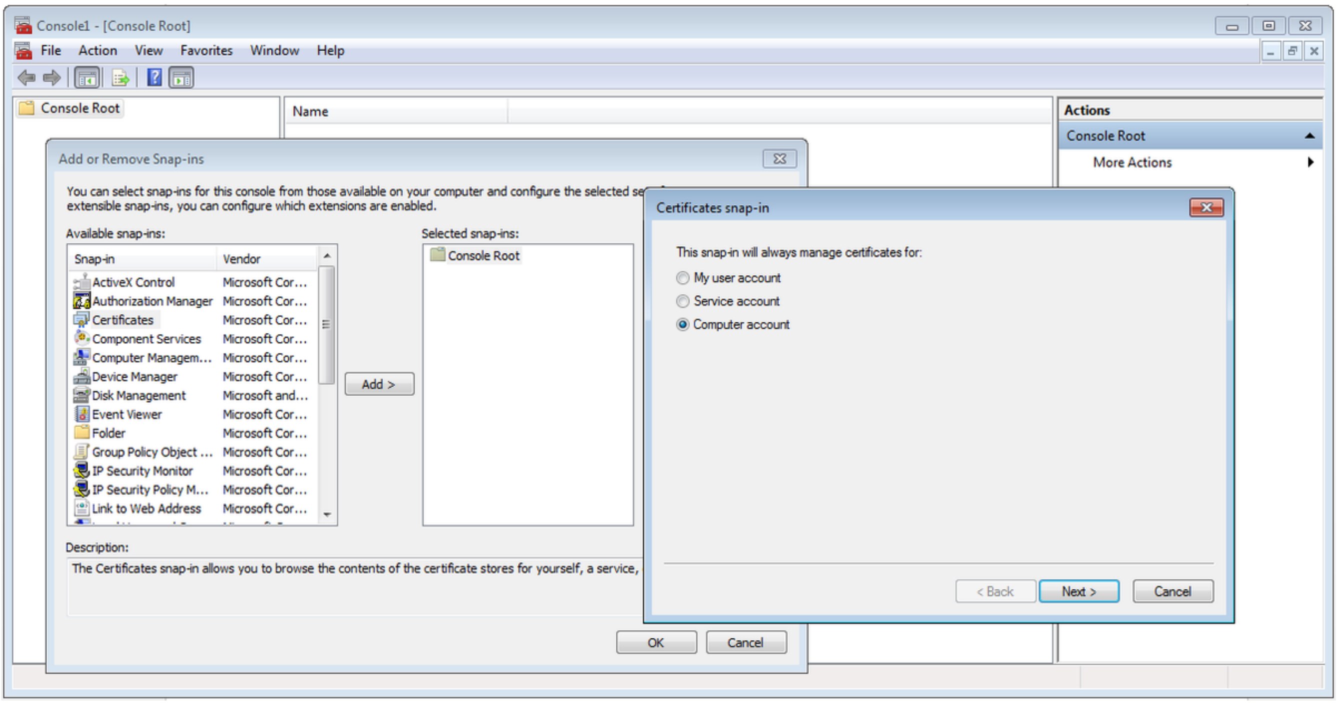


You can select snap-ins for this console from those available on your computer and configure the selected set of snap-ins. For extensible snap-ins, you can configure which extensions are enabled.

Snap-in	Vendor
ActiveX Control	Microsoft Cor...
Authorization Manager	Microsoft Cor...
Certificates	Microsoft Cor...
Component Services	Microsoft Cor...
Computer Managem...	Microsoft Cor...
Device Manager	Microsoft Cor...
Disk Management	Microsoft and...
Event Viewer	Microsoft Cor...
Folder	Microsoft Cor...
Group Policy Object ...	Microsoft Cor...
IP Security Monitor	Microsoft Cor...
IP Security Policy M...	Microsoft Cor...
Link to Web Address	Microsoft Cor...

The ActiveX Control snap-in enables you to add an MMC node with a results view containing an ActiveX control.

ステップ5:[Certificates] > [Add] > [Computer Account]を選択します。



You can select snap-ins for this console from those available on your computer and configure the selected se... extensible snap-ins, you can configure which extensions are enabled.

Available snap-ins:

Snap-in	Vendor
ActiveX Control	Microsoft Cor...
Authorization Manager	Microsoft Cor...
Certificates	Microsoft Cor...
Component Services	Microsoft Cor...
Computer Managem...	Microsoft Cor...
Device Manager	Microsoft Cor...
Disk Management	Microsoft and...
Event Viewer	Microsoft Cor...
Folder	Microsoft Cor...
Group Policy Object ...	Microsoft Cor...
IP Security Monitor	Microsoft Cor...
IP Security Policy M...	Microsoft Cor...
Link to Web Address	Microsoft Cor...

Selected snap-ins:

Console Root

Description:

The Certificates snap-in allows you to browse the contents of the certificate stores for yourself, a service,

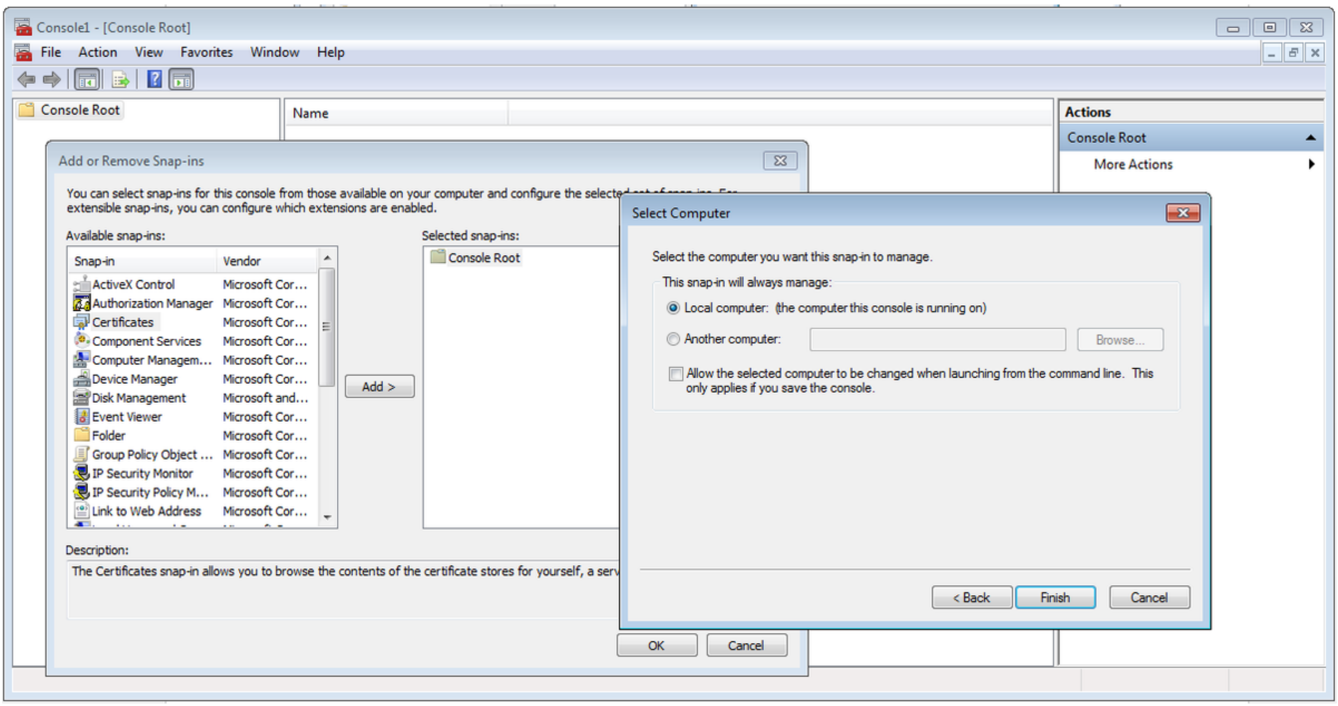
This snap-in will always manage certificates for:

○ My user account

○ Service account

● Computer account

ステップ6:[Next]を選択します。



You can select snap-ins for this console from those available on your computer and configure the selecte... extensible snap-ins, you can configure which extensions are enabled.

Available snap-ins:

Snap-in	Vendor
ActiveX Control	Microsoft Cor...
Authorization Manager	Microsoft Cor...
Certificates	Microsoft Cor...
Component Services	Microsoft Cor...
Computer Managem...	Microsoft Cor...
Device Manager	Microsoft Cor...
Disk Management	Microsoft and...
Event Viewer	Microsoft Cor...
Folder	Microsoft Cor...
Group Policy Object ...	Microsoft Cor...
IP Security Monitor	Microsoft Cor...
IP Security Policy M...	Microsoft Cor...
Link to Web Address	Microsoft Cor...

Selected snap-ins:

Console Root

Description:

The Certificates snap-in allows you to browse the contents of the certificate stores for yourself, a serv

Select the computer you want this snap-in to manage.

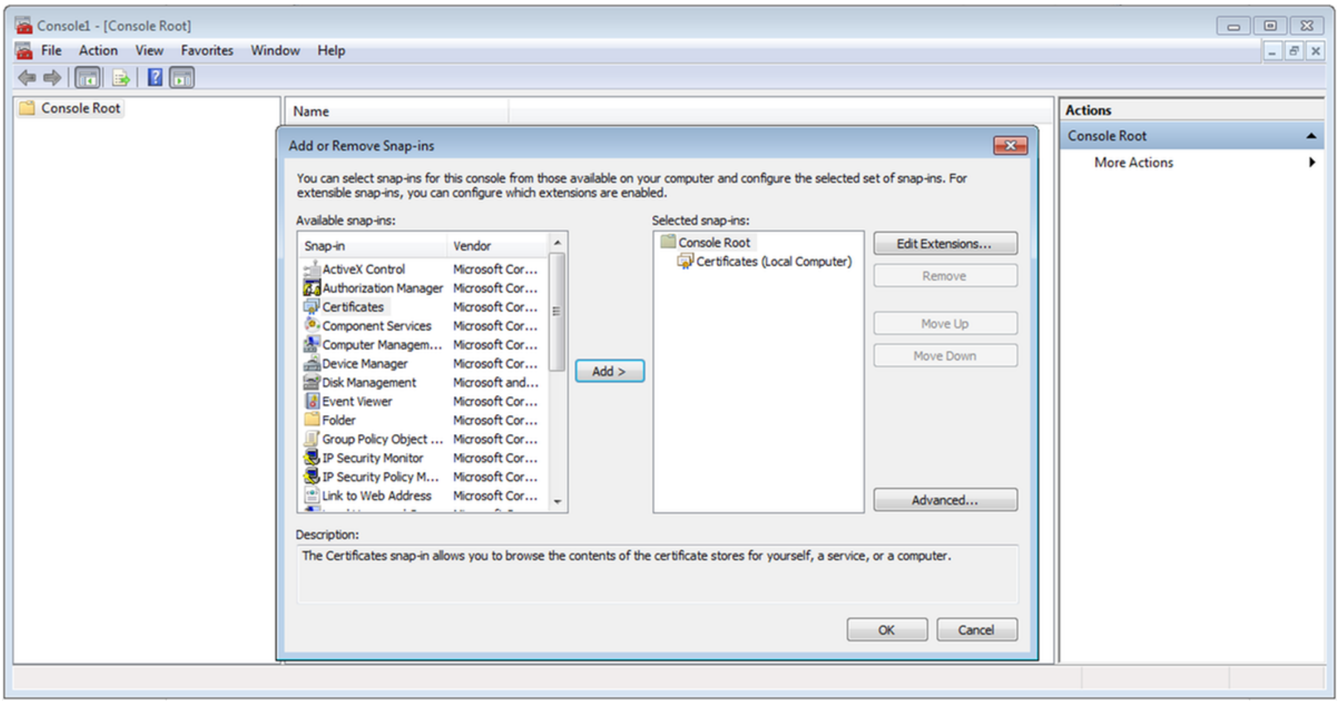
This snap-in will always manage:

● Local computer: (the computer this console is running on)

○ Another computer:

□ Allow the selected computer to be changed when launching from the command line. This only applies if you save the console.

ステップ7:完了。



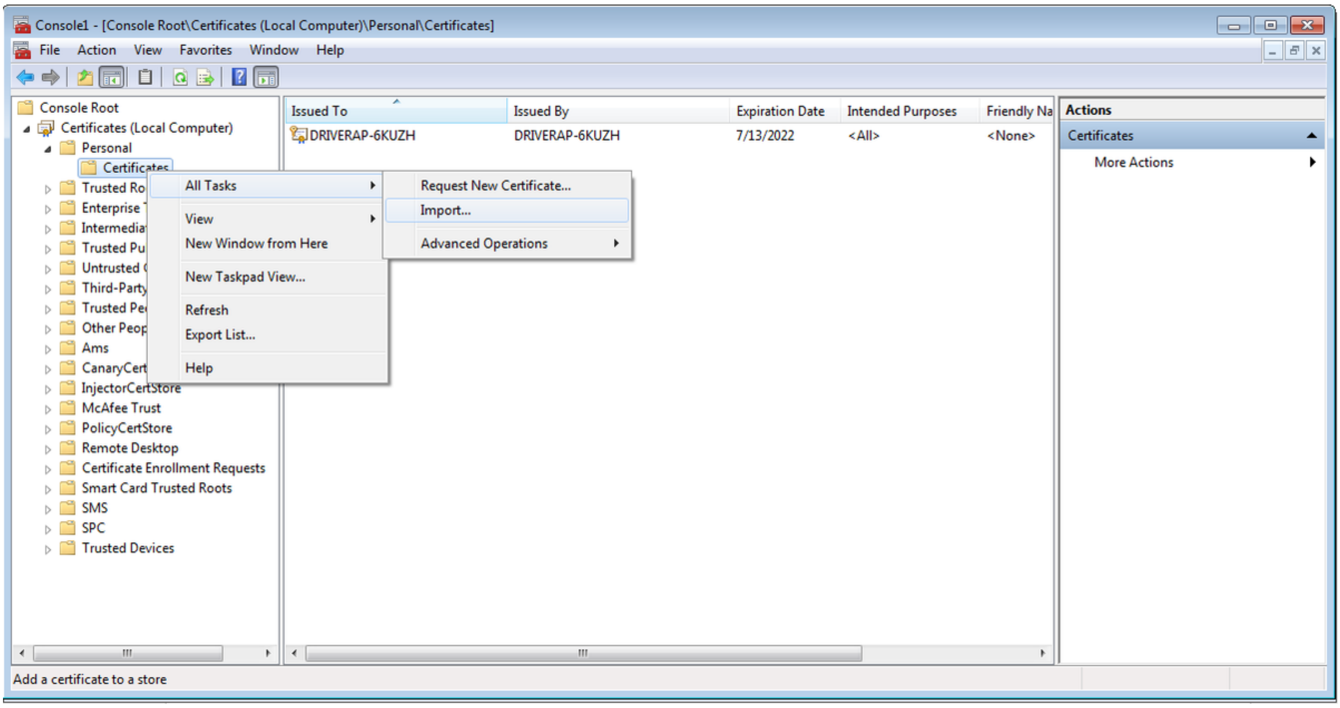
You can select snap-ins for this console from those available on your computer and configure the selected set of snap-ins. For extensible snap-ins, you can configure which extensions are enabled.

Snap-in	Vendor
ActiveX Control	Microsoft Cor...
Authorization Manager	Microsoft Cor...
Certificates	Microsoft Cor...
Component Services	Microsoft Cor...
Computer Managem...	Microsoft Cor...
Device Manager	Microsoft Cor...
Disk Management	Microsoft and...
Event Viewer	Microsoft Cor...
Folder	Microsoft Cor...
Group Policy Object ...	Microsoft Cor...
IP Security Monitor	Microsoft Cor...
IP Security Policy M...	Microsoft Cor...
Link to Web Address	Microsoft Cor...

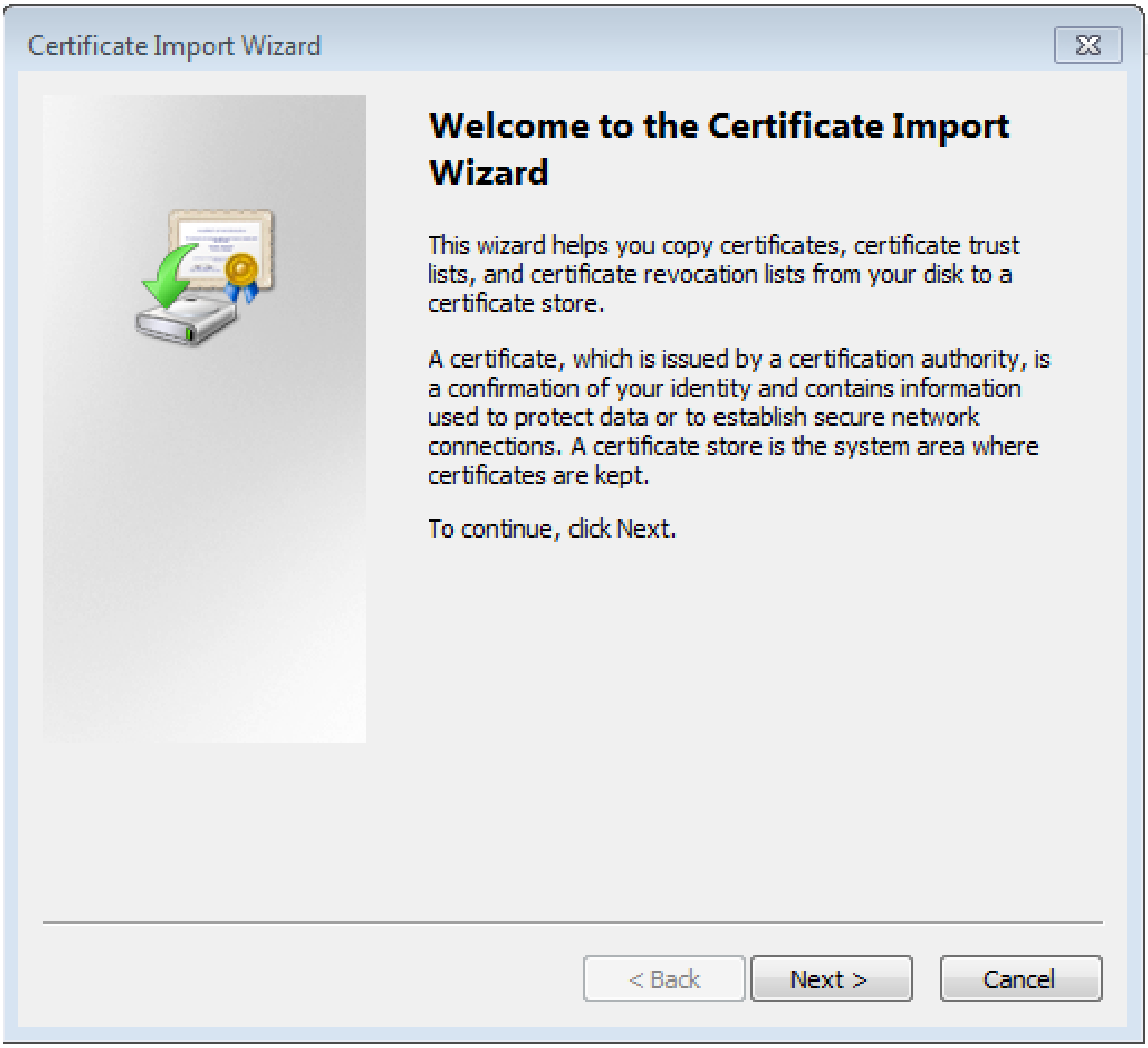
The Certificates snap-in allows you to browse the contents of the certificate stores for yourself, a service, or a computer.

ステップ 8：[OK] を選択します。

ステップ9:[Certificates (**Local Computer)] > [Personal] > [Certificates]に移動**し、フォルダを右クリックし、**[All Tasks] > [Import]に移動します。**



Issued To	Issued By	Expiration Date	Intended Purposes	Friendly Na
DRIVERAP-6KUZH	DRIVERAP-6KUZH	7/13/2022	<All>	<None>



Certificate Import Wizard

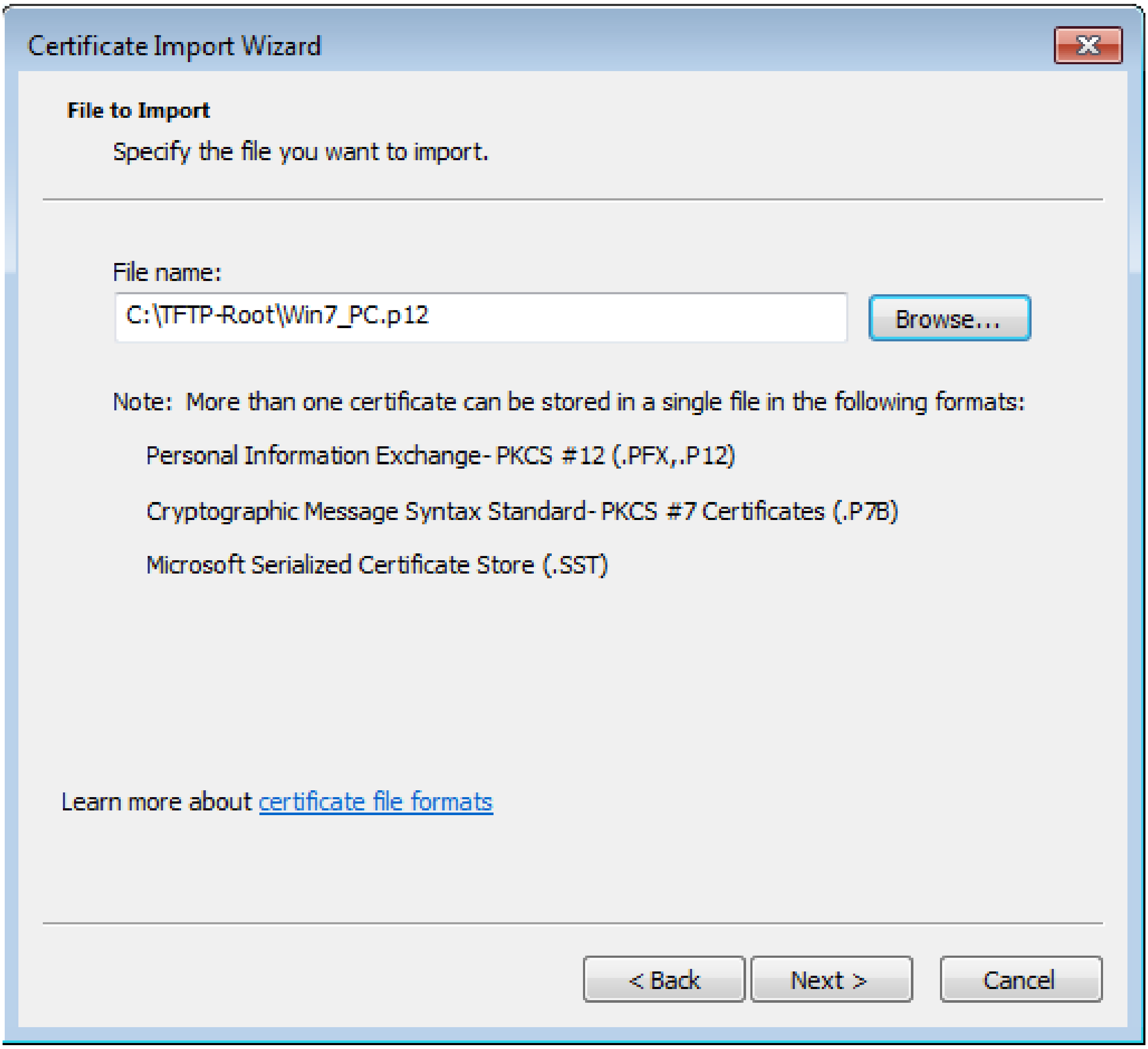
Welcome to the Certificate Import Wizard

This wizard helps you copy certificates, certificate trust lists, and certificate revocation lists from your disk to a certificate store.

A certificate, which is issued by a certification authority, is a confirmation of your identity and contains information used to protect data or to establish secure network connections. A certificate store is the system area where certificates are kept.

To continue, click Next.

ステップ 10：[Next] をクリックします。PKCS12ファイルが保存されるパスを指定します。



Certificate Import Wizard

File to Import

Specify the file you want to import.

File name:

C:\TFTP-Root\Win7_PC.p12

Note: More than one certificate can be stored in a single file in the following formats:

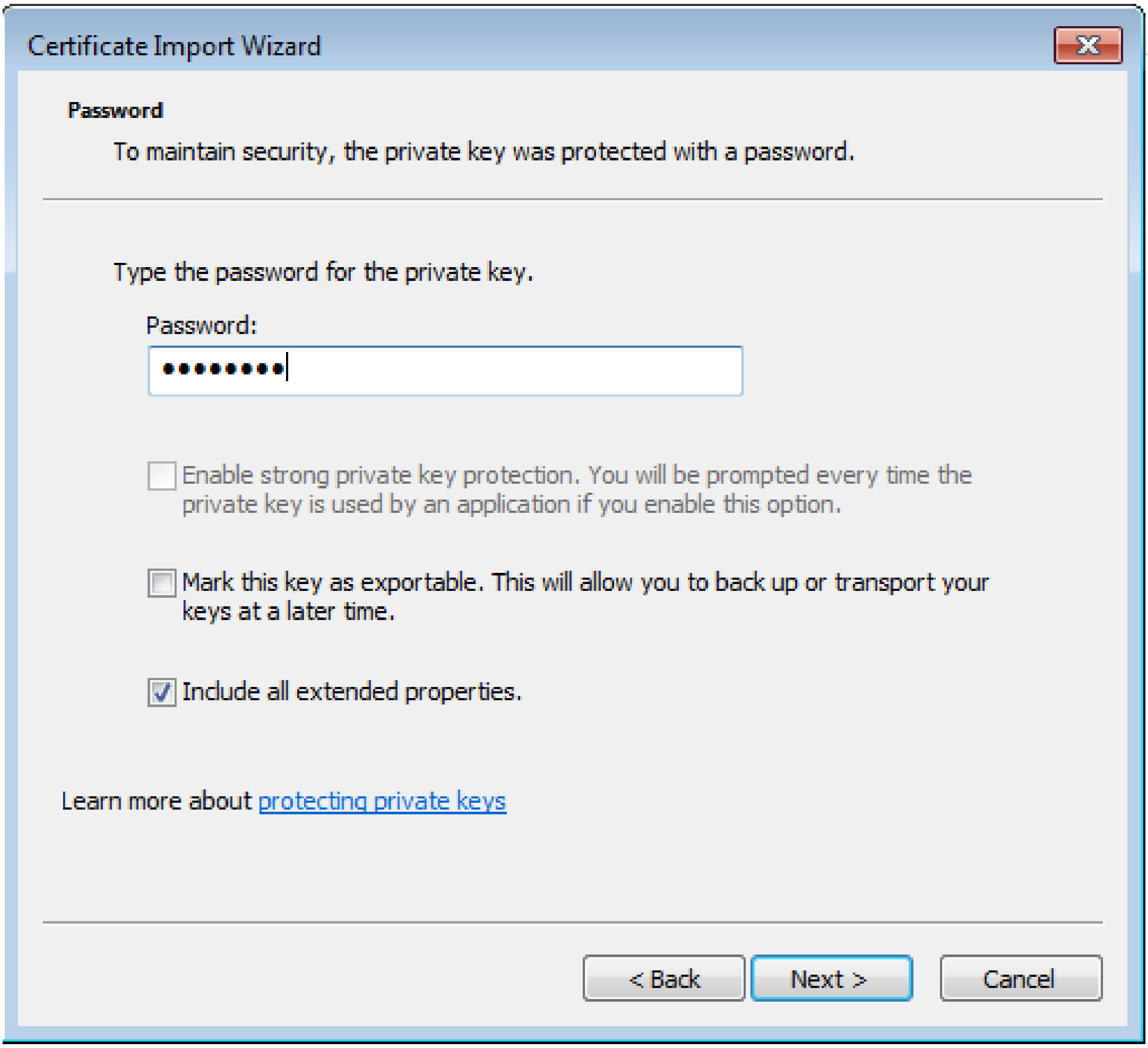
Personal Information Exchange- PKCS #12 (.PFX,.P12)

Cryptographic Message Syntax Standard- PKCS #7 Certificates (.P7B)

Microsoft Serialized Certificate Store (.SST)

Learn more about certificate file formats

ステップ11:[**Next**]を再度選択し、*crypto pki export <Win7_PC> pkcs12 <tftp://10.152.206.175/Win7_PC.p12> password <cisco123>*コマンドで入力したパスワードを入力します



Certificate Import Wizard

Password

To maintain security, the private key was protected with a password.

Type the password for the private key.

Password:

●●●●●●●●●

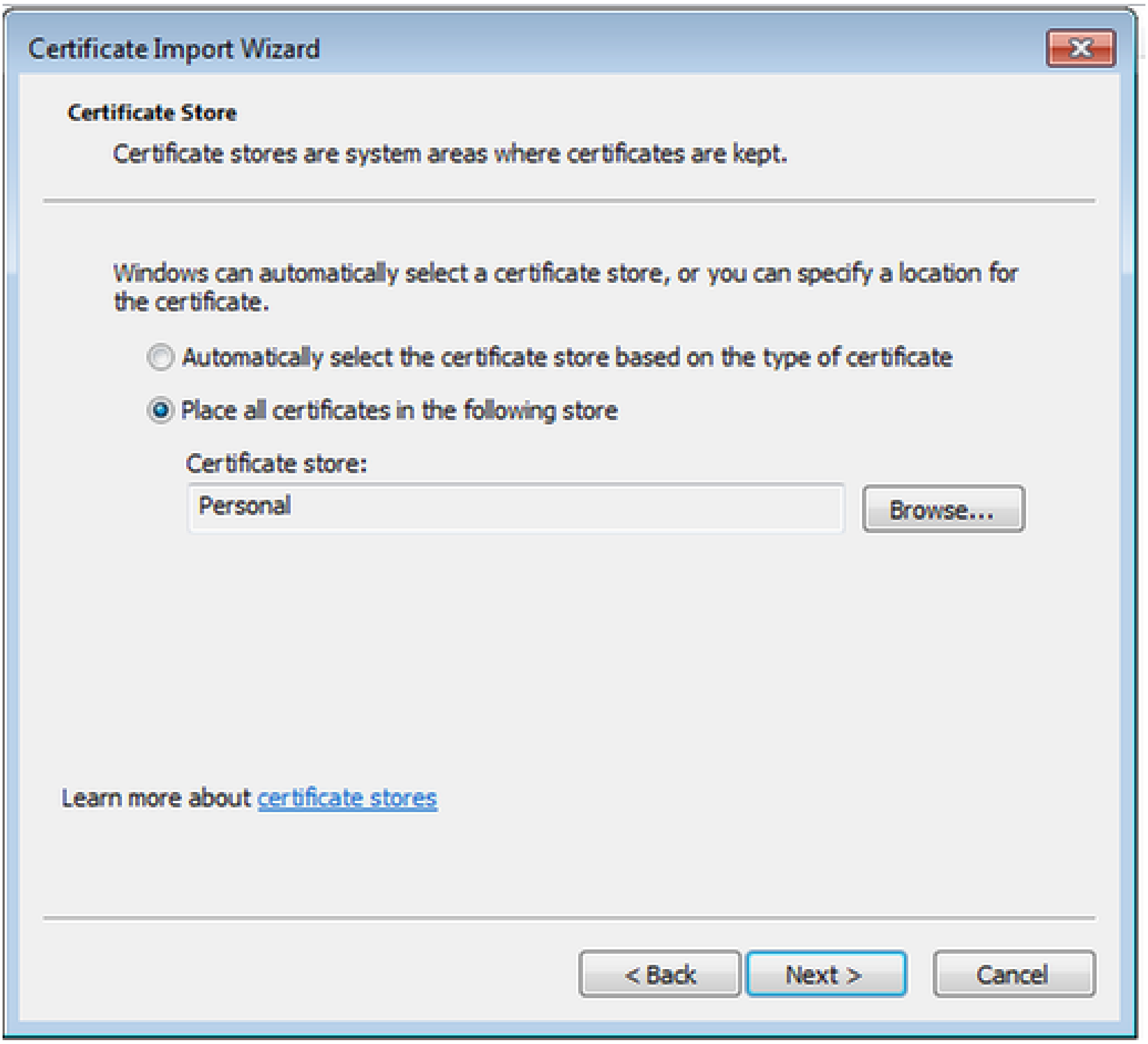
□ Enable strong private key protection. You will be prompted every time the private key is used by an application if you enable this option.

□ Mark this key as exportable. This will allow you to back up or transport your keys at a later time.

☑ Include all extended properties.

Learn more about protecting private keys

ステップ12:[次へ]を選択します。



Certificate Import Wizard

Certificate Store

Certificate stores are system areas where certificates are kept.

Windows can automatically select a certificate store, or you can specify a location for the certificate.

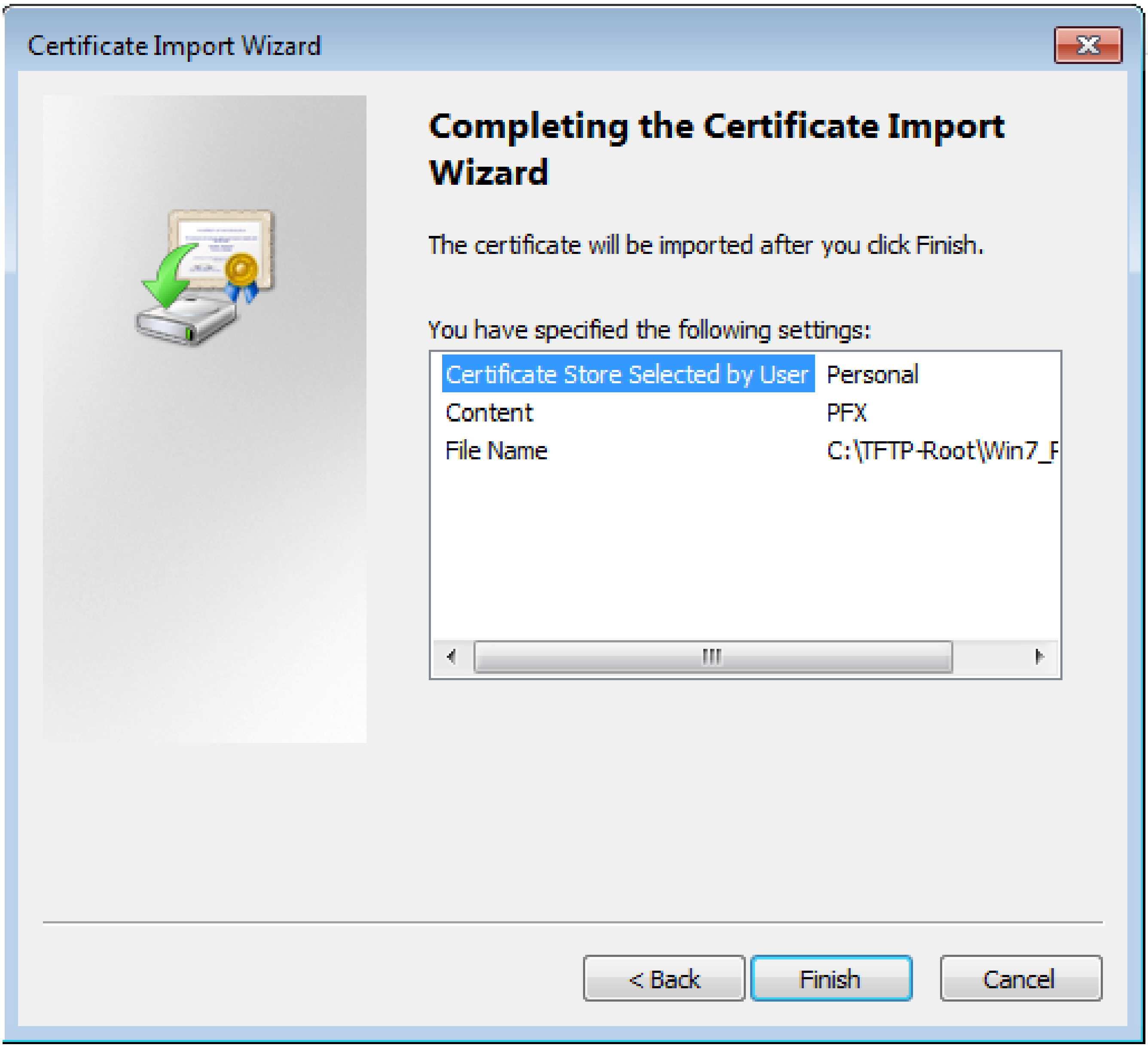
○ Automatically select the certificate store based on the type of certificate

● Place all certificates in the following store

Certificate store:

Personal

ステップ13:[次へ**]を**もう一度選択します。



Certificate Import Wizard

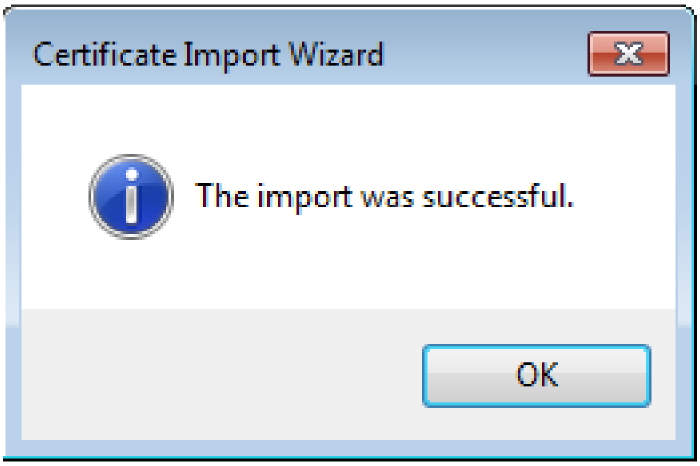
Completing the Certificate Import Wizard

The certificate will be imported after you click Finish.

You have specified the following settings:

Certificate Store Selected by User	Personal
Content	PFX
File Name	C:\TFTP-Root\Win7_F

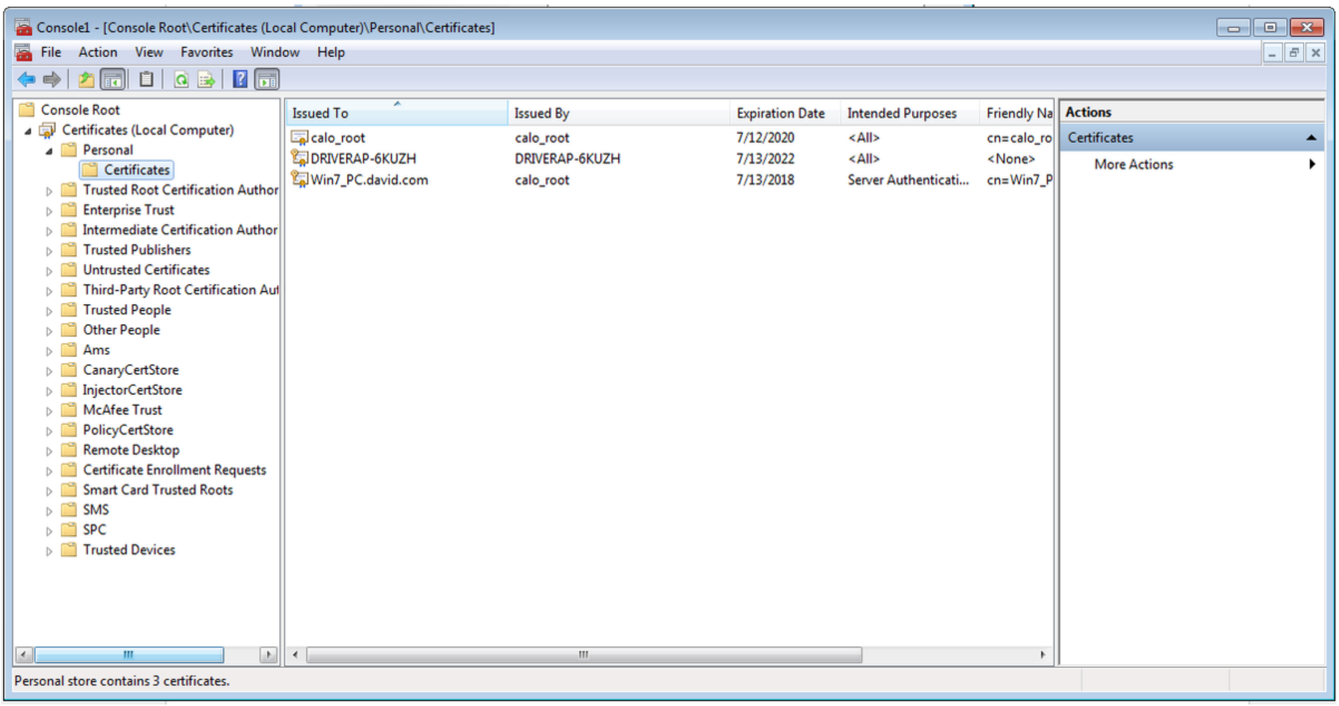
ステップ14:[完了]を**選択します。**



Certificate Import Wizard

The import was successful.

ステップ 15：[OK] **を選択します。**これで、インストールされた証明書（CA証明書とID証明書の両方）が表示されます。



Console1 - [Console Root\Certificates (Local Computer)\Personal\Certificates]

- Console Root
  - Certificates (Local Computer)
    - Personal
      - Certificates
    - Trusted Root Certification Author
    - Enterprise Trust
    - Intermediate Certification Author
    - Trusted Publishers
    - Untrusted Certificates
    - Third-Party Root Certification Aut
    - Trusted People
    - Other People
    - Ams
    - CanaryCertStore
    - InjectorCertStore
    - McAfee Trust
    - PolicyCertStore
    - Remote Desktop
    - Certificate Enrollment Requests
    - Smart Card Trusted Roots
    - SMS
    - SPC
    - Trusted Devices

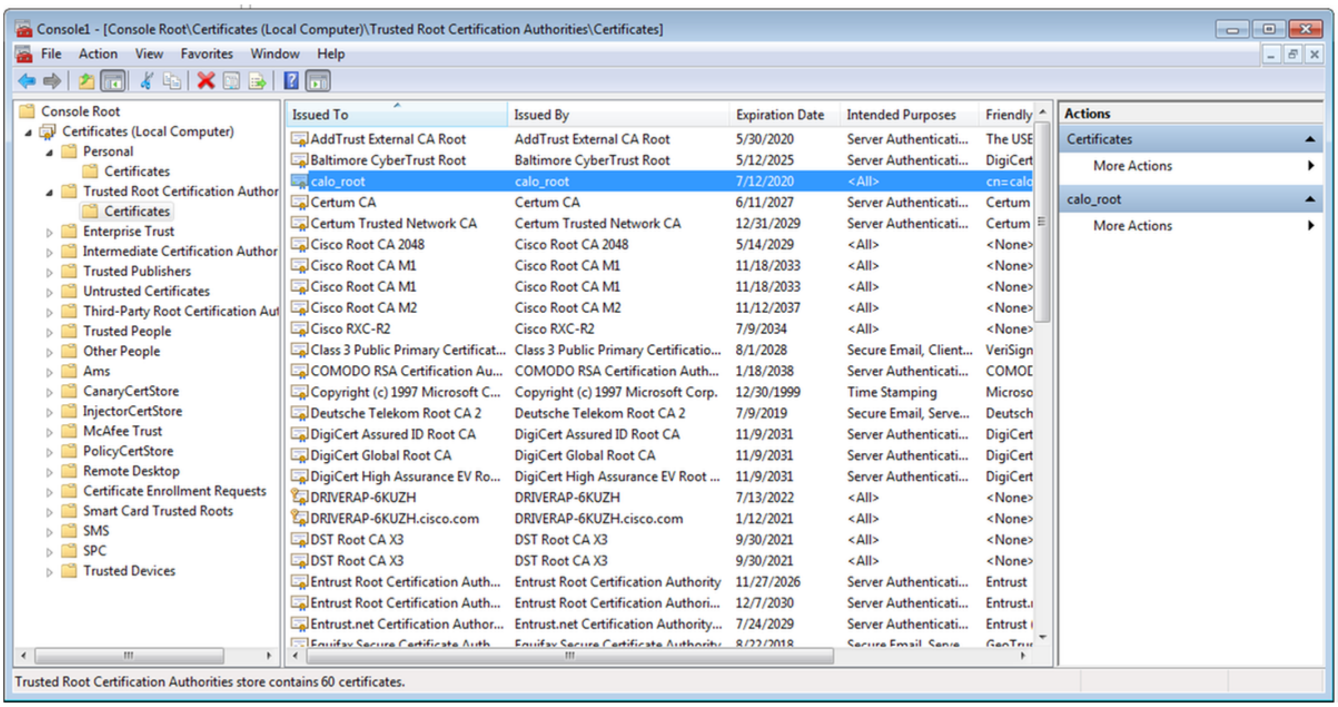
Issued To	Issued By	Expiration Date	Intended Purposes	Friendly Na
calo_root	calo_root	7/12/2020	<All>	cn=calo_ro
DRIVERAP-6KUZH	DRIVERAP-6KUZH	7/13/2022	<All>	<None>
Win7_PC.david.com	calo_root	7/13/2018	Server Authenticati...	cn=Win7_P

Actions
- Certificates
  - More Actions

Personal store contains 3 certificates.

ステップ16:[Certificates (**Local Computer)] > [Personal] > [Certificates (Local Computer)] > [Trusted Root Certification Authority] > [Certificates]にCA証明書をドラッグアンドドロップします**

。



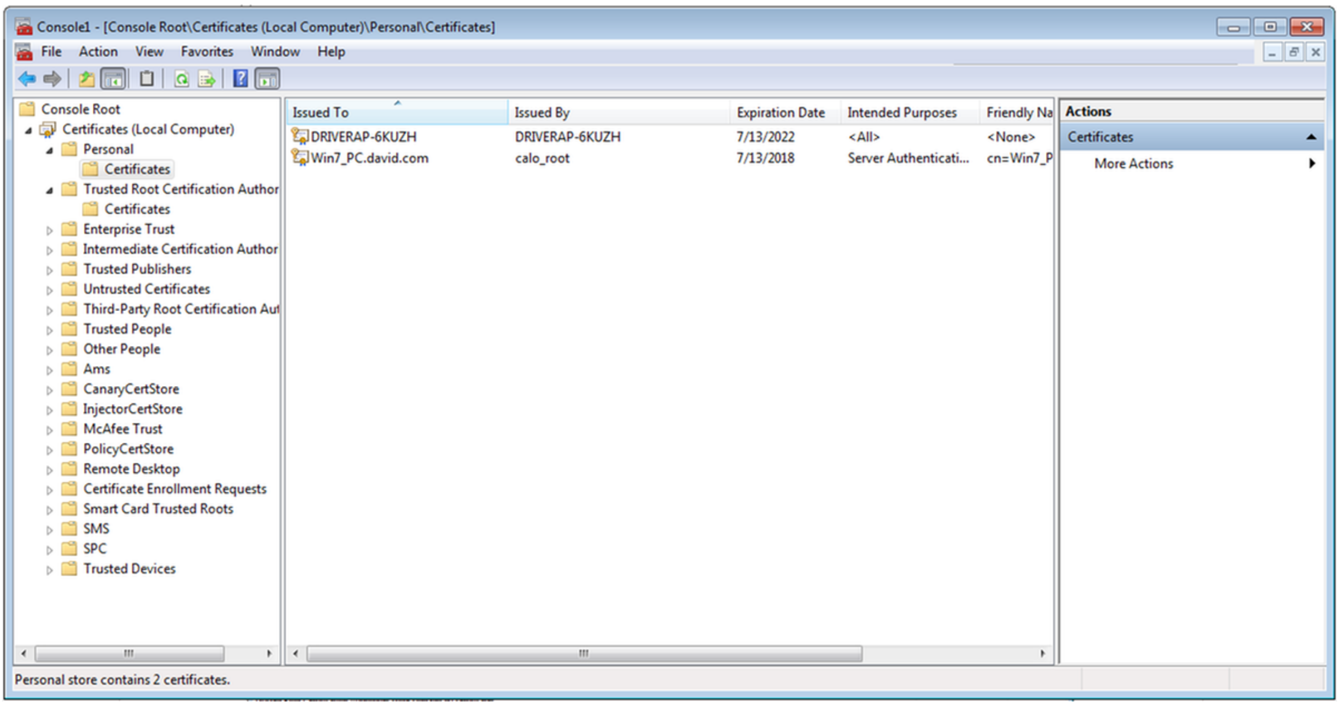
Console1 - [Console Root\Certificates (Local Computer)\Trusted Root Certification Authorities\Certificates]

- Console Root
  - Certificates (Local Computer)
    - Personal
      - Certificates
    - Trusted Root Certification Author
      - Certificates
    - Enterprise Trust
    - Intermediate Certification Author
    - Trusted Publishers
    - Untrusted Certificates
    - Third-Party Root Certification Aut
    - Trusted People
    - Other People
    - Ams
    - CanaryCertStore
    - InjectorCertStore
    - McAfee Trust
    - PolicyCertStore
    - Remote Desktop
    - Certificate Enrollment Requests
    - Smart Card Trusted Roots
    - SMS
    - SPC
    - Trusted Devices

Issued To	Issued By	Expiration Date	Intended Purposes	Friendly
AddTrust External CA Root	AddTrust External CA Root	5/30/2020	Server Authenticati...	The USE
Baltimore CyberTrust Root	Baltimore CyberTrust Root	5/12/2025	Server Authenticati...	DigiCert
calo_root	calo_root	7/12/2020	<All>	cn=calo
Certum CA	Certum CA	6/11/2027	Server Authenticati...	Certum
Certum Trusted Network CA	Certum Trusted Network CA	12/31/2029	Server Authenticati...	Certum
Cisco Root CA 2048	Cisco Root CA 2048	5/14/2029	<All>	<None>
Cisco Root CA M1	Cisco Root CA M1	11/18/2033	<All>	<None>
Cisco Root CA M1	Cisco Root CA M1	11/18/2033	<All>	<None>
Cisco Root CA M2	Cisco Root CA M2	11/12/2037	<All>	<None>
Cisco RXC-R2	Cisco RXC-R2	7/9/2034	<All>	<None>
Class 3 Public Primary Certificat...	Class 3 Public Primary Certificatio...	8/1/2028	Secure Email, Client...	VeriSign
COMODO RSA Certification Au...	COMODO RSA Certification Auth...	1/18/2038	Server Authenticati...	COMOD
Copyright (c) 1997 Microsoft C...	Copyright (c) 1997 Microsoft Corp.	12/30/1999	Time Stamping	Microso
Deutsche Telekom Root CA 2	Deutsche Telekom Root CA 2	7/9/2019	Secure Email, Serve...	Deutsch
DigiCert Assured ID Root CA	DigiCert Assured ID Root CA	11/9/2031	Server Authenticati...	DigiCert
DigiCert Global Root CA	DigiCert Global Root CA	11/9/2031	Server Authenticati...	DigiCert
DigiCert High Assurance EV Ro...	DigiCert High Assurance EV Root ...	11/9/2031	Server Authenticati...	DigiCert
DRIVERAP-6KUZH	DRIVERAP-6KUZH	7/13/2022	<All>	<None>
DRIVERAP-6KUZH.cisco.com	DRIVERAP-6KUZH.cisco.com	1/12/2021	<All>	<None>
DST Root CA X3	DST Root CA X3	9/30/2021	<All>	<None>
DST Root CA X3	DST Root CA X3	9/30/2021	<All>	<None>
Entrust Root Certification Auth...	Entrust Root Certification Authority	11/27/2026	Server Authenticati...	Entrust
Entrust Root Certification Auth...	Entrust Root Certification Authori...	12/7/2030	Server Authenticati...	Entrust.i
Entrust.net Certification Author...	Entrust.net Certification Authority...	7/24/2029	Server Authenticati...	Entrust
Equifax Secure Certificate Auth	Equifax Secure Certificate Authority	8/22/2018	Secure Email, Serve	GeoTru

Actions
- Certificates
  - More Actions
- calo_root
  - More Actions

Trusted Root Certification Authorities store contains 60 certificates.


Console1 - [Console Root\Certificates (Local Computer)\Personal\Certificates]
File
Action
View
Favorites
Window
Help
Actions
Certificates
More Actions

Console Root
- Certificates (Local Computer)
  - Personal
    - Certificates
  - Trusted Root Certification Author
    - Certificates
  - Enterprise Trust
  - Intermediate Certification Author
  - Trusted Publishers
  - Untrusted Certificates
  - Third-Party Root Certification Aut
  - Trusted People
  - Other People
  - Ams
  - CanaryCertStore
  - InjectorCertStore
  - McAfee Trust
  - PolicyCertStore
  - Remote Desktop
  - Certificate Enrollment Requests
  - Smart Card Trusted Roots
  - SMS
  - SPC
  - Trusted Devices

Issued To	Issued By	Expiration Date	Intended Purposes	Friendly Na
DRIVERAP-6KUZH	DRIVERAP-6KUZH	7/13/2022	<All>	<None>
Win7_PC.david.com	calo_root	7/13/2018	Server Authenticati...	cn=Win7_P

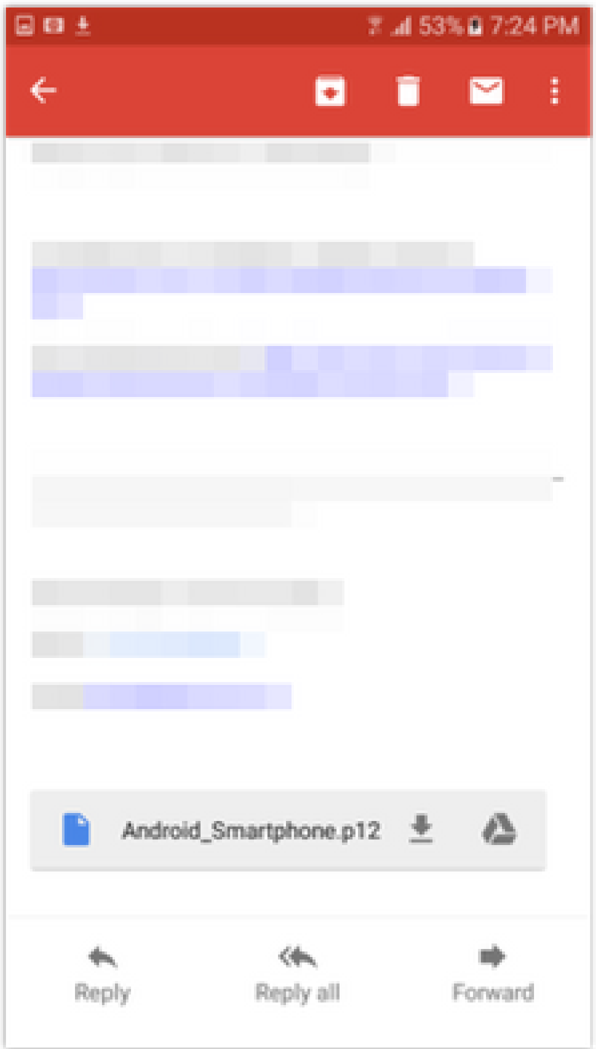
Personal store contains 2 certificates.

AndroidモバイルデバイスにID証明書をインストールする方法

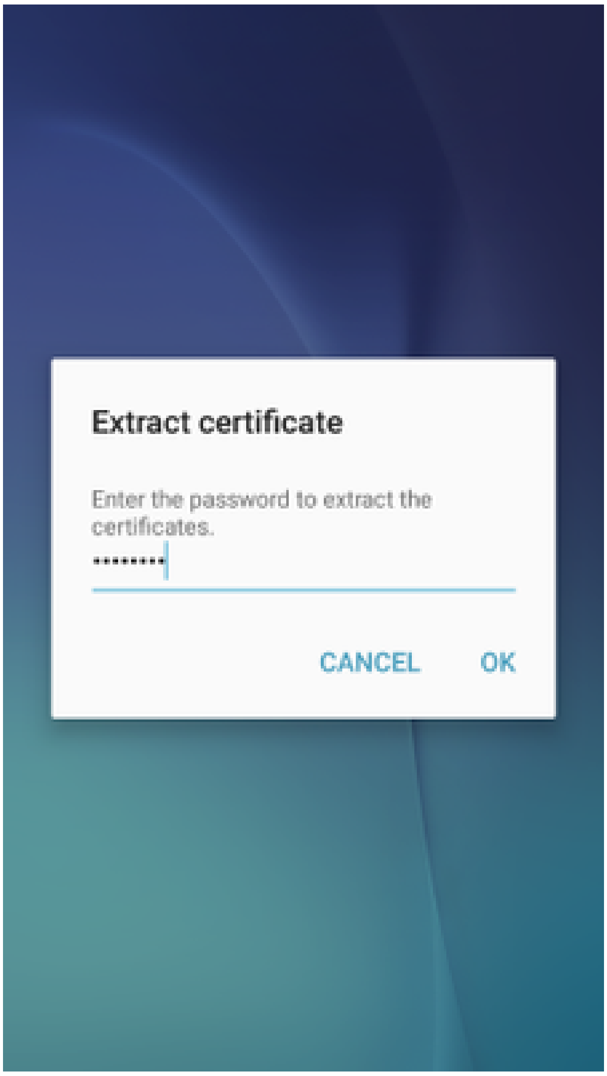
注：Androidでは、.pfxまたは.p12拡張子を持つPKCS#12キーストアファイルがサポートされています。

注：Androidは、DERエンコードX.509 SSL証明書のみをサポートします。

ステップ1:IOS CAサーバからPKCS12(.p12)形式でクライアント証明書をエクスポートした後、ファイルを電子メールでAndroidデバイスに送信します。ファイルが表示されたら、ファイル名をタップして自動インストールを開始します。(**ファイルをダウンロードしないでください**)



ステップ2：証明書のエクスポートに使用するパスワードを入力します。この例では、パスワードはcisco123です。

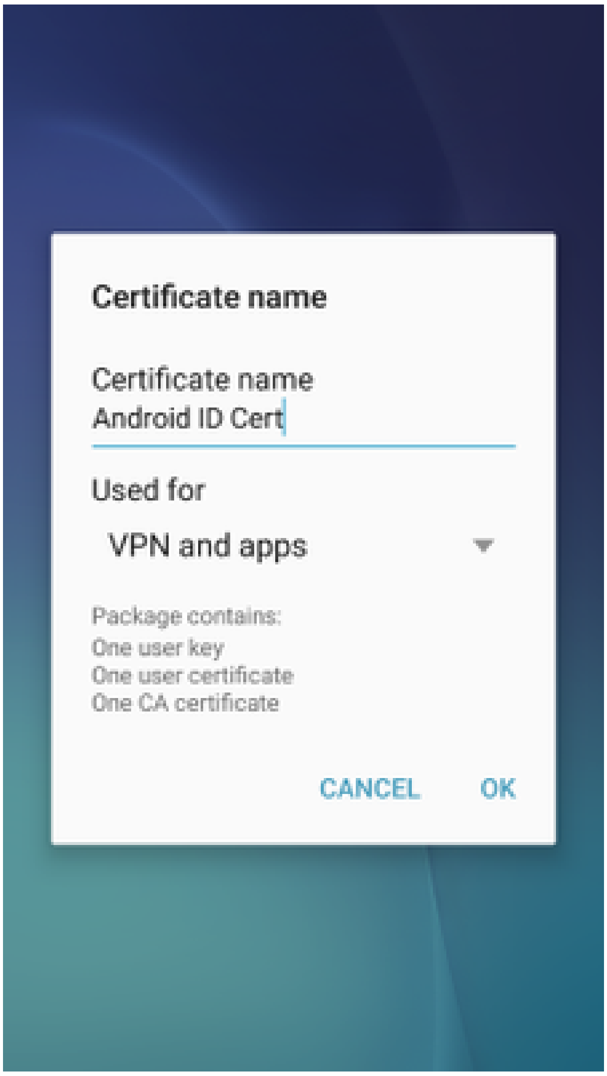


Extract certificate

Enter the password to extract the certificates.

****

ステップ3:**[OK]**を**選択**し、証明書名を**入力します**。任意の単語を使用できます。この例では、名前は**Android ID Cert**です。



Certificate name

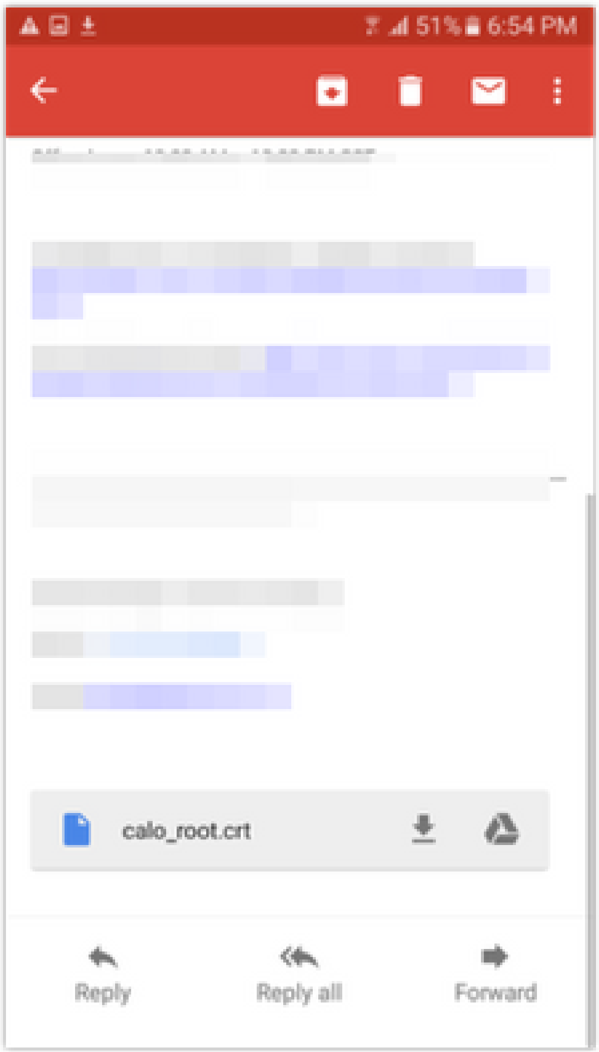
Certificate name
Android ID Cert

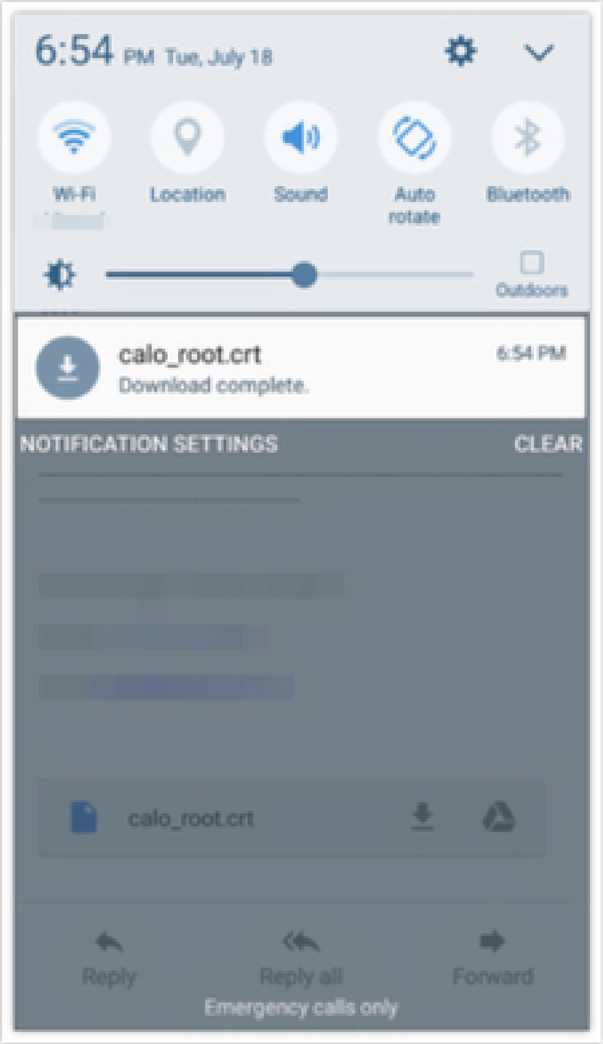
Used for
VPN and apps

Package contains:
One user key
One user certificate
One CA certificate

ステップ4:[**OK**]を選**択**すると、「Android ID Cert installed」というメッセージが表示されます。

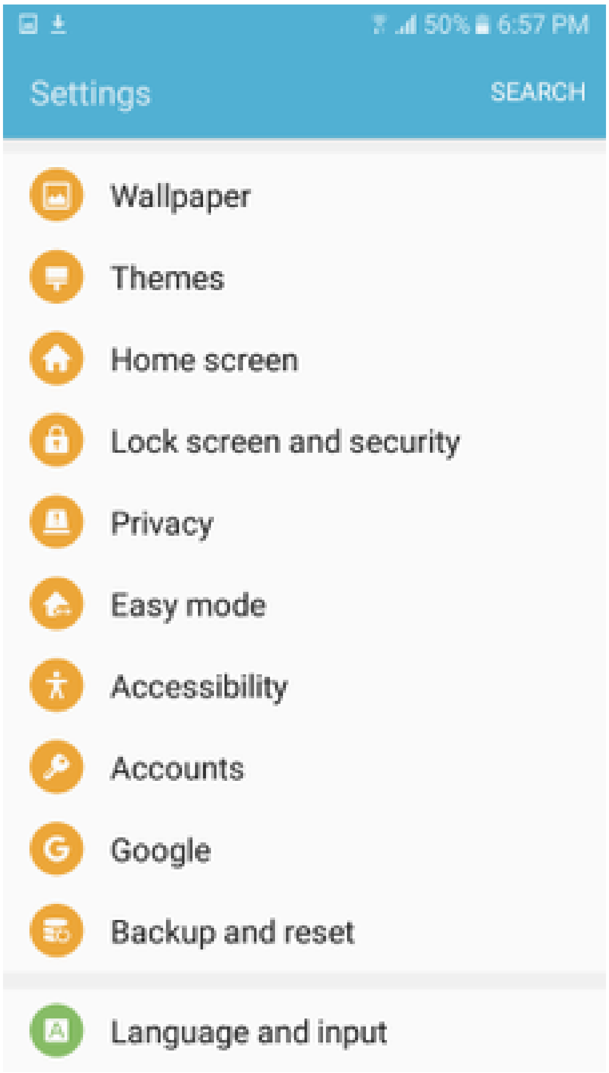
ステップ5:CA証明書をインストールするには、IOS CAサーバからbase64形式で抽出し、.crt拡張子を付けて保存します。Androidデバイスに電子メールでファイルを送信します。今回は、ファイルの名前の横にある矢印をタップして、ファイルをダウンロードする必要があります。


51% 6:54 PM
calo_root.crt
Reply
Reply all
Forward

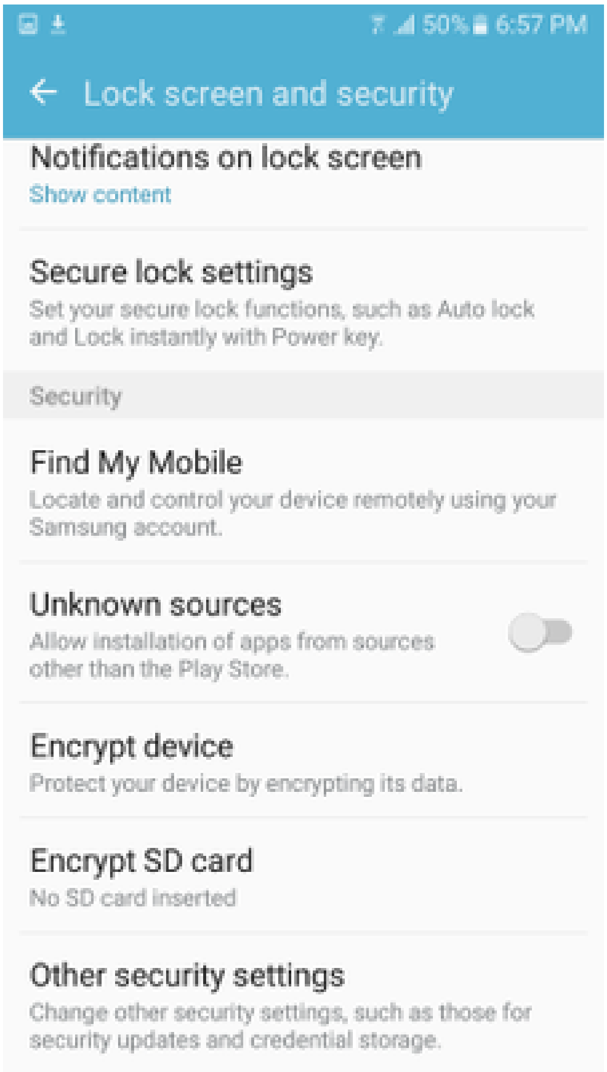


calo_root.crt
Download complete.
6:54 PM

ステップ6:[Settings]に移動し、**[Lock screen and security]を選択します。**



ステップ7:[その他のセキュリティ**設定]を選択します。**



Lock screen and security

Notifications on lock screen
Show content

Secure lock settings
Set your secure lock functions, such as Auto lock and Lock instantly with Power key.

Security

Find My Mobile
Locate and control your device remotely using your Samsung account.

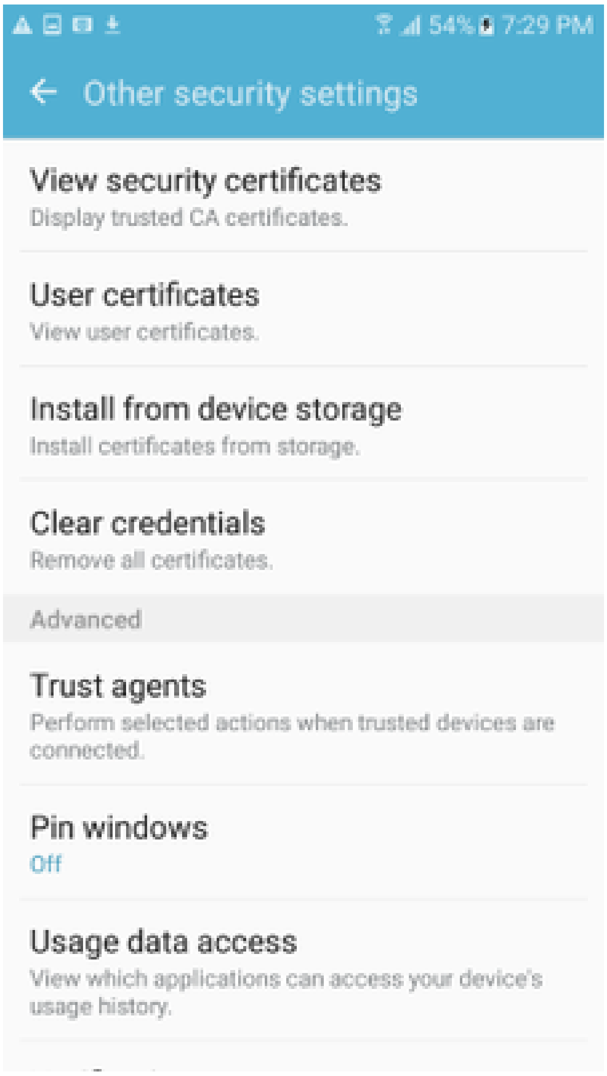
Unknown sources
Allow installation of apps from sources other than the Play Store.

Encrypt device
Protect your device by encrypting its data.

Encrypt SD card
No SD card inserted

Other security settings
Change other security settings, such as those for security updates and credential storage.

ステップ8:[Install from **device storage]に移動します。**



54% 7:29 PM

Other security settings

View security certificates
Display trusted CA certificates.

User certificates
View user certificates.

Install from device storage
Install certificates from storage.

Clear credentials
Remove all certificates.

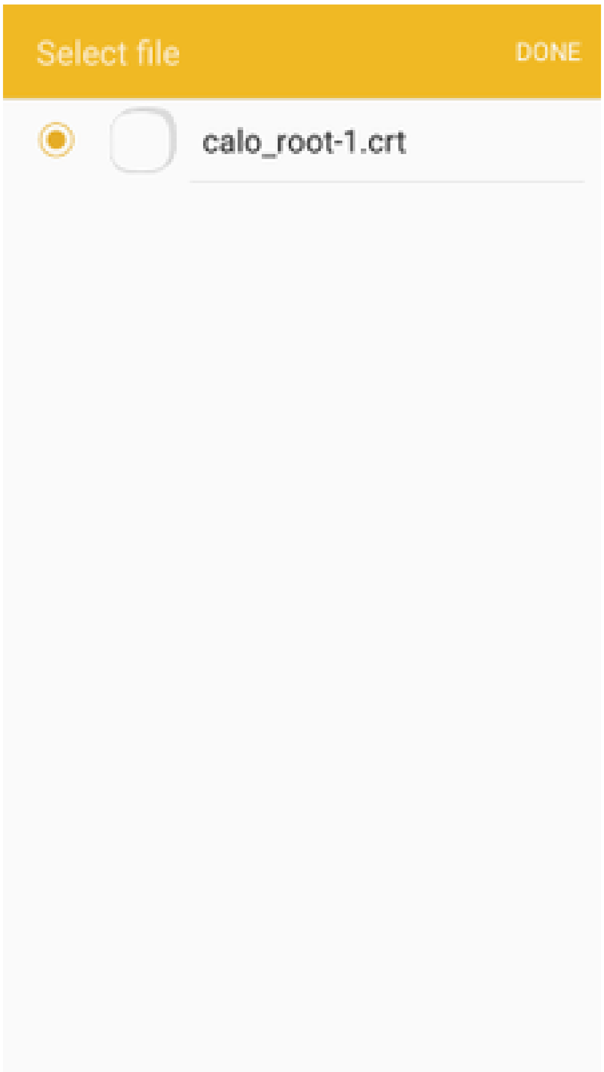
Advanced

Trust agents
Perform selected actions when trusted devices are connected.

Pin windows
Off

Usage data access
View which applications can access your device's usage history.

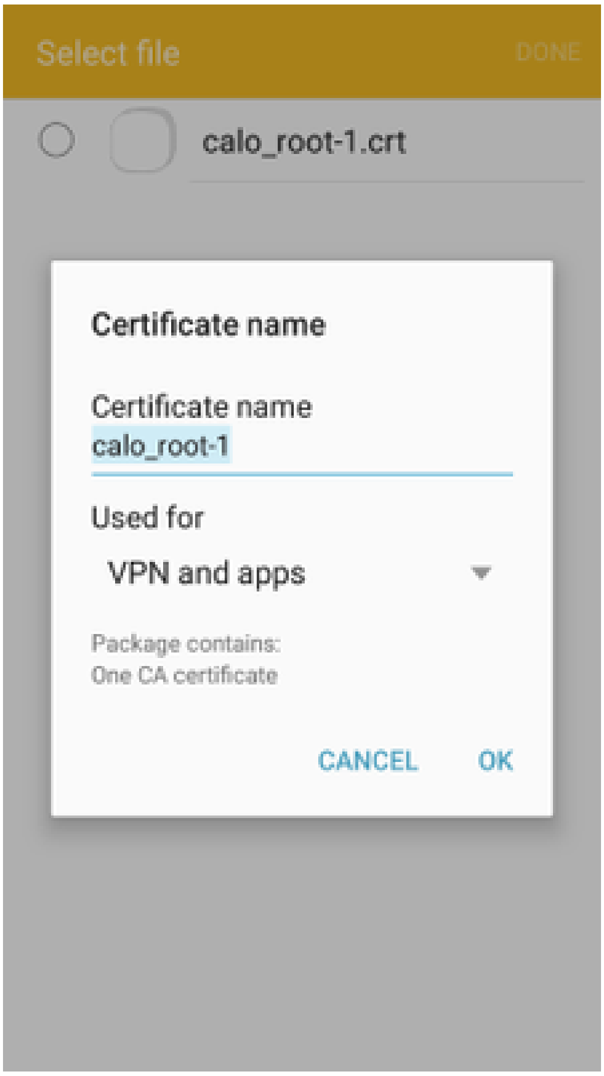
ステップ9:.crtファイルを選択し、[完了]をタップ**します。**



Select file DONE

● calo_root-1.crt

ステップ10：証明書名を**入力します**。任意の単語を指定できます。この例では、名前は**calo_root-1です**。



calo_root-1.crt

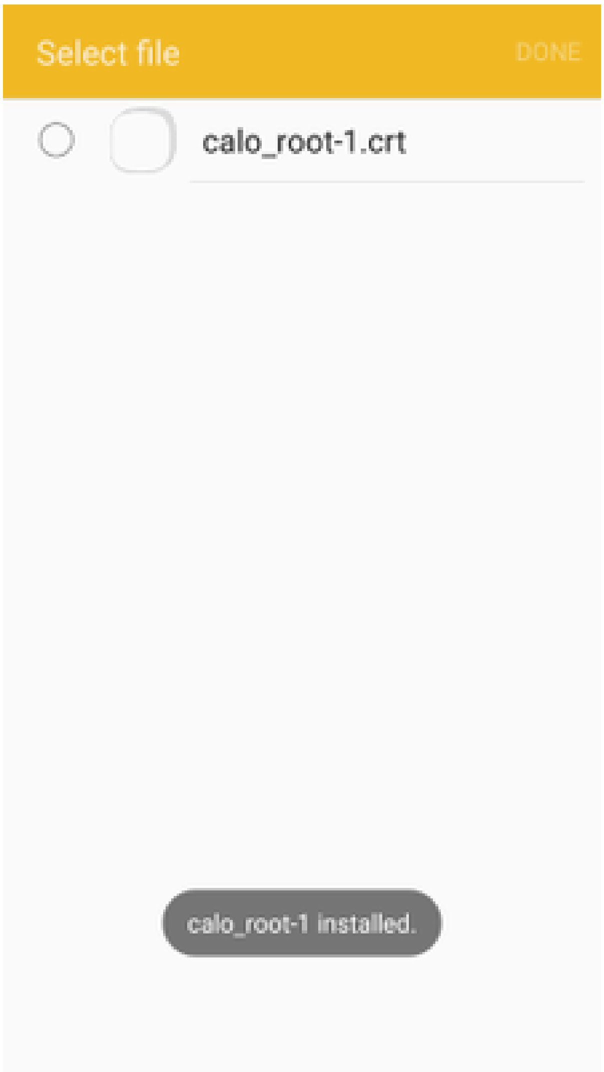
Certificate name

Certificate name
calo_root-1

Used for
VPN and apps

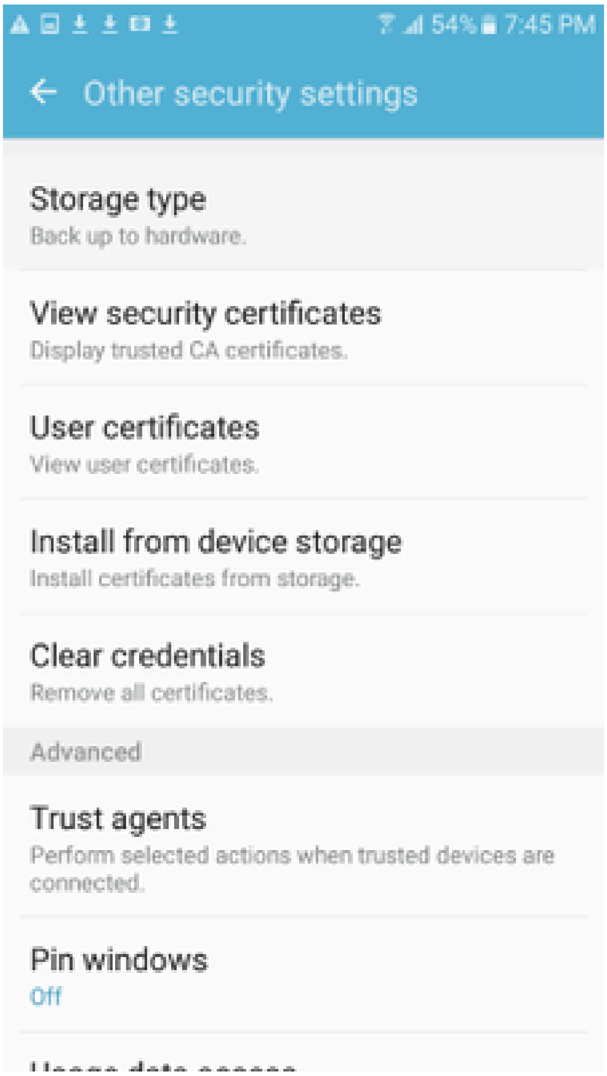
Package contains:
One CA certificate

ステップ10:[OK]を選択すると、「calo_root-1 installed」というメッセージが表示されます。



calo_root-1 installed.

ステップ11:ID証明書がインストールされていることを確認するには、[Settings/Lock Screen and Security/Other] > [Security Settings/User Certificates/System]タブに移動します。



54% 7:45 PM

Other security settings

Storage type
Back up to hardware.

View security certificates
Display trusted CA certificates.

User certificates
View user certificates.

Install from device storage
Install certificates from storage.

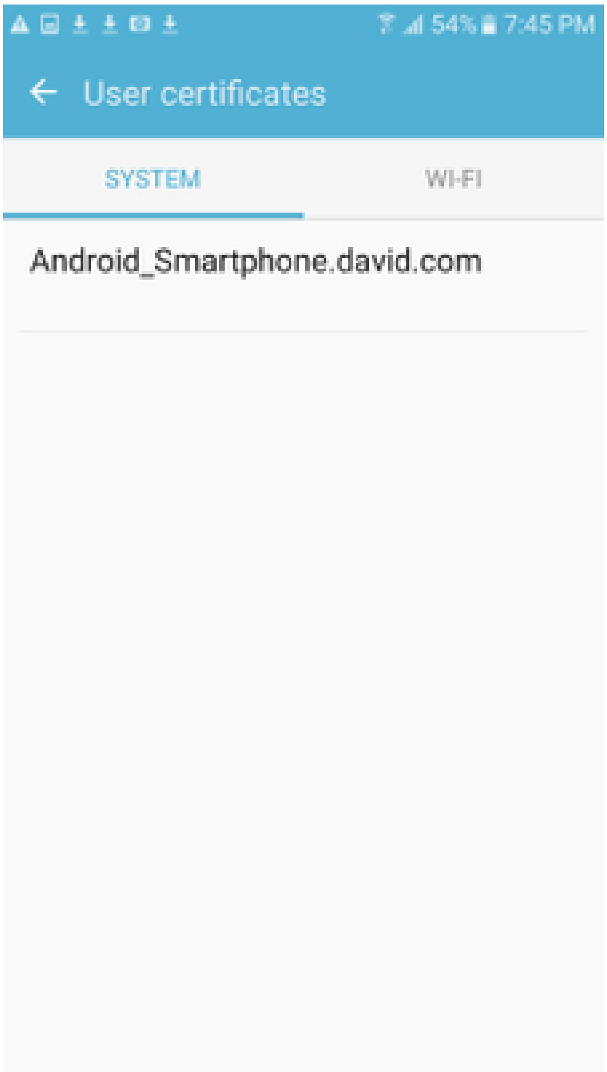
Clear credentials
Remove all certificates.

Advanced

Trust agents
Perform selected actions when trusted devices are connected.

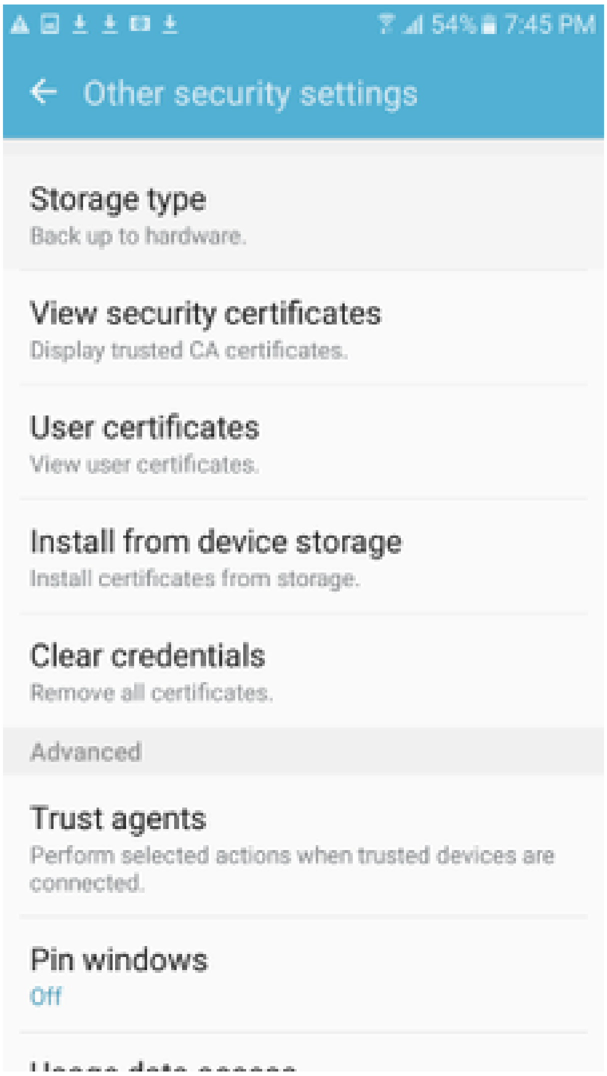
Pin windows
Off

Usage data access



Android_Smartphone.david.com

ステップ12:CA証明書がインストールされていることを確認するには、[Settings/Lock]画面と[Security/Other security settings/View security certificates/User]タブに移動します。



54% 7:45 PM

Other security settings

Storage type
Back up to hardware.

View security certificates
Display trusted CA certificates.

User certificates
View user certificates.

Install from device storage
Install certificates from storage.

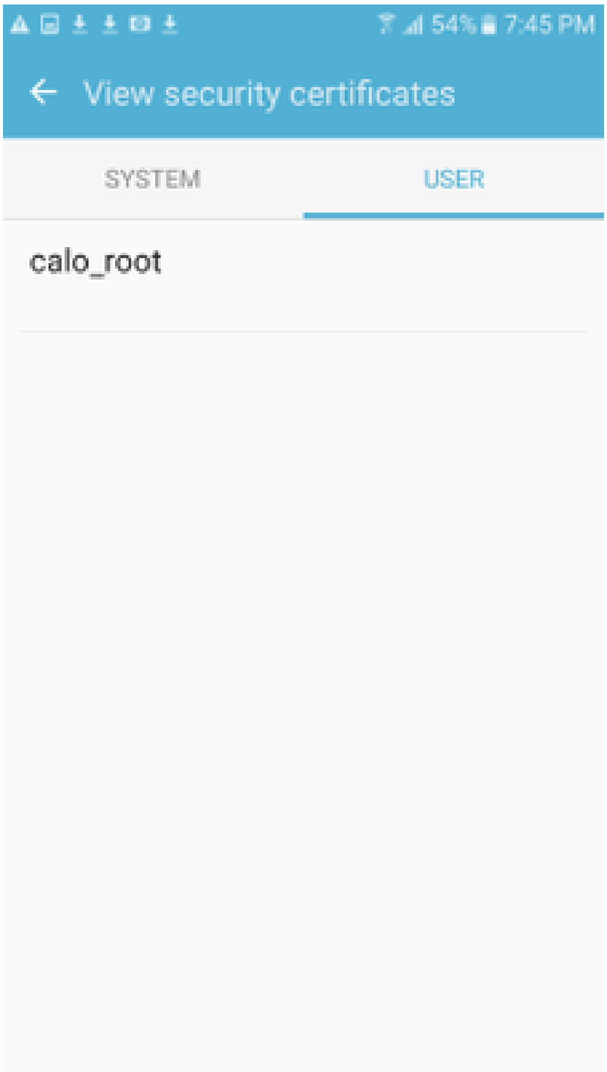
Clear credentials
Remove all certificates.

Advanced

Trust agents
Perform selected actions when trusted devices are connected.

Pin windows
Off

Usage data access



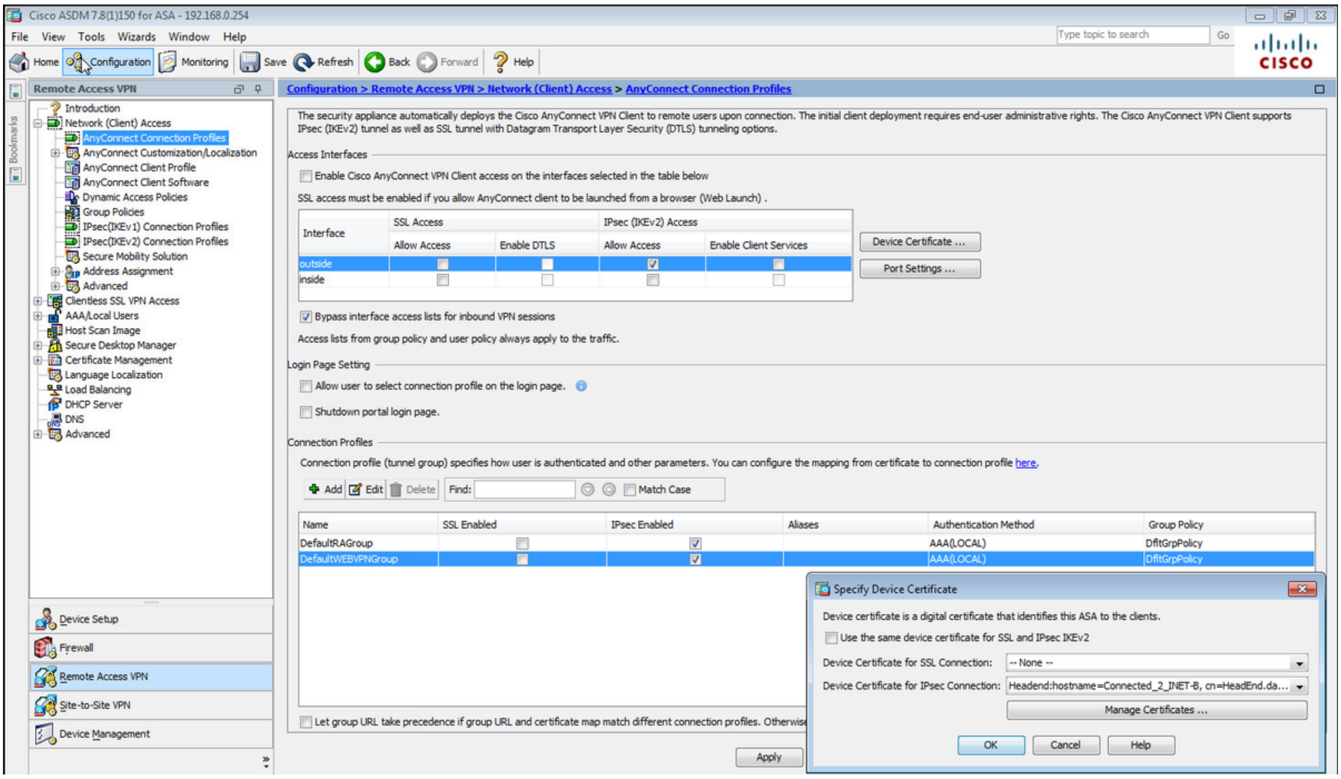
IKEv2によるRA VPNのASAヘッドエンドの設定

ステップ1:ASDMで、[Configuration] > [Remote Access VPN] > [Network (client) Access] > [Anyconnect Connection Profiles] に移動します。VPNクライアントに面**したインターフェイスで、[IPSec (IKEv2) access, Allow Access]ボックスをオンにします([Enable Client Services]**オプションは不要)。

ステップ2:**[Device Certificate]を選択**し、**[Use the same device certificate for SSL and IPSec IKEv2]からチェックマークを外します。**

ステップ3:IPSec接続のヘッドエンド証明書を選択し、SSL接続で[None]を選択します。

このオプションは、crypto ikev2、crypto ipsec、crypto dynamic-map、およびcrypto map設定を配置します。


Cisco ASDM 7.8(1)150 for ASA - 192.168.0.254
File View Tools Wizards Window Help
Home Configuration Monitoring Save Refresh Back Forward Help
Remote Access VPN
Introduction
Network (Client) Access
AnyConnect Connection Profiles
AnyConnect Customization/Localization
AnyConnect Client Profile
AnyConnect Client Software
Dynamic Access Policies
Group Policies
IPsec(IKEv1) Connection Profiles
IPsec(IKEv2) Connection Profiles
Secure Mobility Solution
Address Assignment
Advanced
Clientless SSL VPN Access
AAA/Local Users
Host Scan Image
Secure Desktop Manager
Certificate Management
Language Localization
Load Balancing
DHCP Server
DNS
Advanced
Device Setup
Firewall
Remote Access VPN
Site-to-Site VPN
Device Management

Configuration > Remote Access VPN > Network (Client) Access > AnyConnect Connection Profiles

The security appliance automatically deploys the Cisco AnyConnect VPN Client to remote users upon connection. The initial client deployment requires end-user administrative rights. The Cisco AnyConnect VPN Client supports IPsec (IKEv2) tunnel as well as SSL tunnel with Datagram Transport Layer Security (DTLS) tunneling options.

Access Interfaces

□ Enable Cisco AnyConnect VPN Client access on the interfaces selected in the table below

SSL access must be enabled if you allow AnyConnect client to be launched from a browser (Web Launch) .

Interface	SSL Access		IPsec (IKEv2) Access	
	Allow Access	Enable DTLS	Allow Access	Enable Client Services
outside	□	□	☑	□
inside	□	□	□	□

Device Certificate ... Port Settings ...

☑ Bypass interface access lists for inbound VPN sessions

Access lists from group policy and user policy always apply to the traffic.

Login Page Setting

□ Allow user to select connection profile on the login page.

□ Shutdown portal login page.

Connection Profiles

Connection profile (tunnel group) specifies how user is authenticated and other parameters. You can configure the mapping from certificate to connection profile here.

Add Edit Delete Find: □ Match Case

Name	SSL Enabled	IPsec Enabled	Aliases	Authentication Method	Group Policy
DefaultRAGroup	□	☑		AAA(LOCAL)	DfltGrpPolicy
DefaultWEBVPNGroup	□	☑		AAA(LOCAL)	DfltGrpPolicy

□ Let group URL take precedence if group URL and certificate map match different connection profiles. Otherwis

Apply

Specify Device Certificate

Device certificate is a digital certificate that identifies this ASA to the clients.

□ Use the same device certificate for SSL and IPsec IKEv2

Device Certificate for SSL Connection: -- None --

Device Certificate for IPsec Connection: Headend:hostname=Connected_2_INET-B, cn=HeadEnd.da...

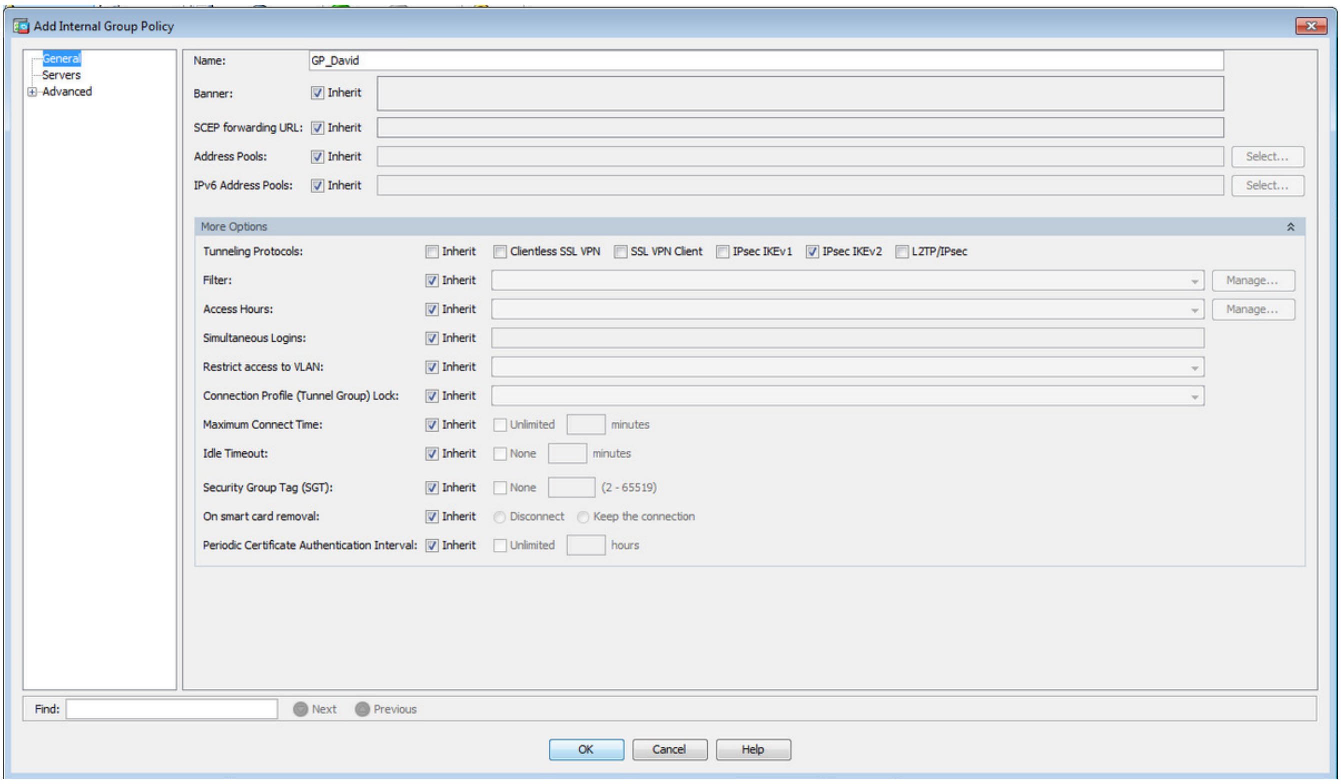
Manage Certificates ...

OK Cancel Help

これは、コマンドラインインターフェイス(CLI)での設定の外観です。

```
crypto ikev2 policy 1
 encryption aes-256
 integrity sha
 group 5
 prf sha
 lifetime seconds 86400
crypto ikev2 enable outside

crypto ikev2 remote-access trustpoint HeadEnd
crypto ipsec ikev2 ipsec-proposal AES256
 protocol esp encryption aes-256
 protocol esp integrity sha-1 md5

crypto dynamic-map Anyconnect 65535 set ikev2 ipsec-proposal AES256
crypto map outside_map 65535 ipsec-isakmp dynamic Anyconnect
crypto map outside_map interface outside
```

ステップ4:[Configuration] > [Remote Access VPN] > [Network (Client) Access] > [Group Policies]に移動し、グループポリシーを作成します



Add Internal Group Policy

Name: GP_David

Banner: ☑ Inherit

SCEP forwarding URL: ☑ Inherit

Address Pools: ☑ Inherit

IPv6 Address Pools: ☑ Inherit

More Options

Tunneling Protocols: □ Inherit □ Clientless SSL VPN □ SSL VPN Client □ IPsec IKEv1 ☑ IPsec IKEv2 □ L2TP/IPsec

Filter: ☑ Inherit

Access Hours: ☑ Inherit

Simultaneous Logins: ☑ Inherit

Restrict access to VLAN: ☑ Inherit

Connection Profile (Tunnel Group) Lock: ☑ Inherit

Maximum Connect Time: ☑ Inherit □ Unlimited minutes

Idle Timeout: ☑ Inherit □ None minutes

Security Group Tag (SGT): ☑ Inherit □ None (2 - 65519)

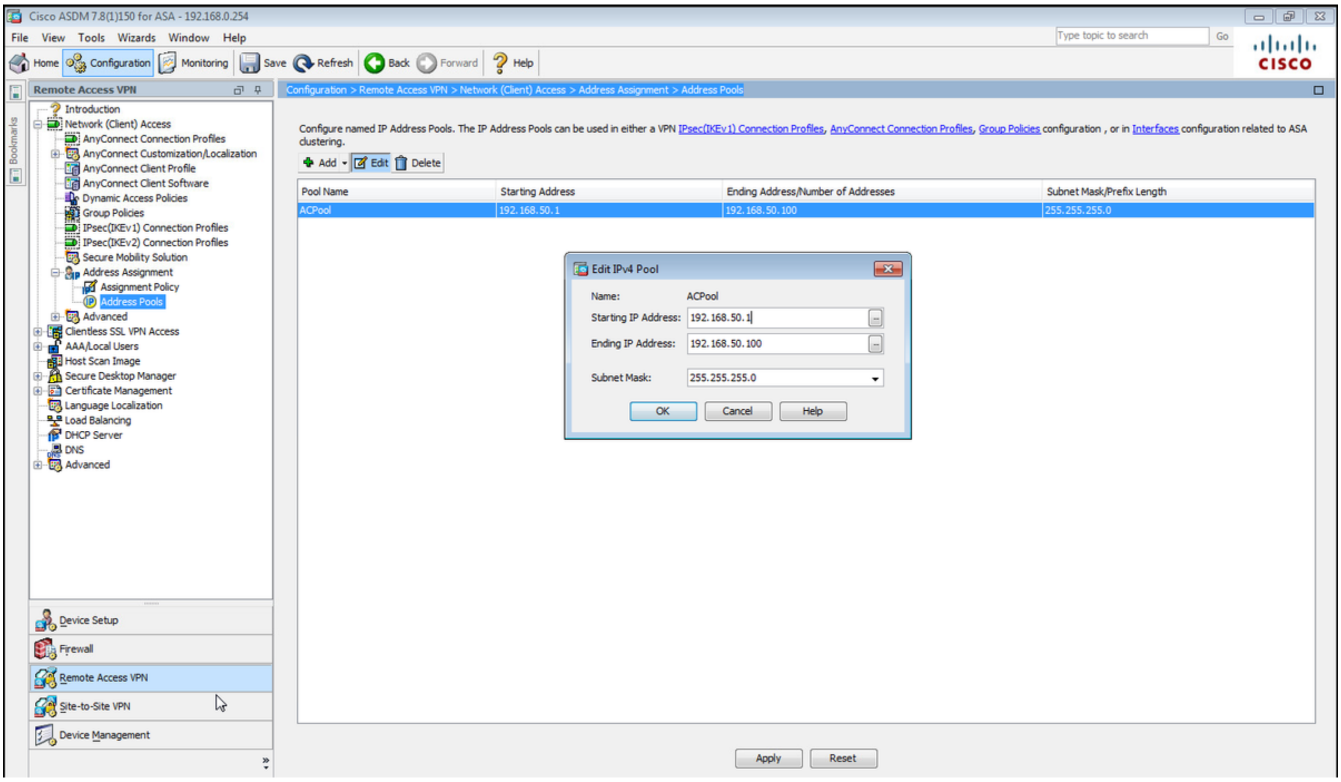
On smart card removal: ☑ Inherit ○ Disconnect ○ Keep the connection

Periodic Certificate Authentication Interval: ☑ Inherit □ Unlimited hours

CLI

```
group-policy GP_David internal
group-policy GP_David attributes
 vpn-tunnel-protocol ikev2
```

ステップ5:[Configuration] > [Remote Access VPN] > [Network (Client) Access] > [Address Pools]に移動し、[Add]を選択してIPv4プールを作成します。



Cisco ASDM 7.8(1)150 for ASA - 192.168.0.254

Configuration > Remote Access VPN > Network (Client) Access > Address Assignment > Address Pools

Configure named IP Address Pools. The IP Address Pools can be used in either a VPN IPsec(IKEv1) Connection Profiles, AnyConnect Connection Profiles, Group Policies configuration , or in Interfaces configuration related to ASA clustering.

Pool Name	Starting Address	Ending Address/Number of Addresses	Subnet Mask/Prefix Length
ACPool	192.168.50.1	192.168.50.100	255.255.255.0

Edit IPv4 Pool

Name: ACPool

Starting IP Address: 192.168.50.1

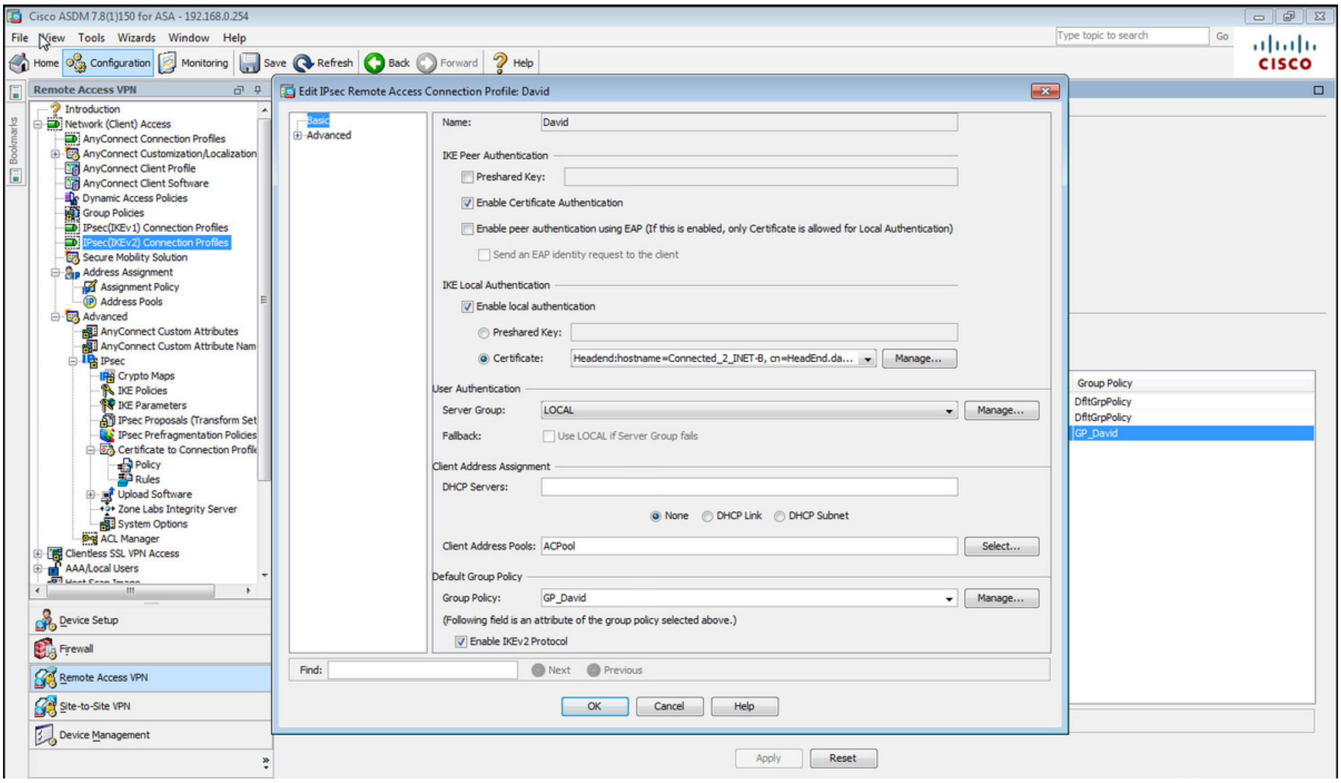
Ending IP Address: 192.168.50.100

Subnet Mask: 255.255.255.0

CLI

```
ip local pool ACPool 192.168.50.1-192.168.50.100 mask 255.255.255.0
```

ステップ6:[Configuration] > [Remote Access VPN] > [Network (Client) Access] > [IPSec(IKEv2) Connection Profiles]に移動し、[Add]を選択して新しいトンネルグループを作成します。


Cisco ASDM 7.8(1)150 for ASA - 192.168.0.254
File View Tools Wizards Window Help
Home Configuration Monitoring Save Refresh Back Forward Help
Remote Access VPN
Introduction
Network (Client) Access
AnyConnect Connection Profiles
AnyConnect Customization/Localization
AnyConnect Client Profile
AnyConnect Client Software
Dynamic Access Policies
Group Policies
IPsec(IKEv1) Connection Profiles
IPsec(IKEv2) Connection Profiles
Secure Mobility Solution
Address Assignment
Assignment Policy
Address Pools
Advanced
AnyConnect Custom Attributes
AnyConnect Custom Attribute Nam
IPsec
Crypto Maps
IKE Policies
IKE Parameters
IPsec Proposals (Transform Set
IPsec Prefragmentation Policies
Certificate to Connection Profil
Policy
Rules
Upload Software
Zone Labs Integrity Server
System Options
ACL Manager
Clientless SSL VPN Access
AAA/Local Users
Device Setup
Firewall
Remote Access VPN
Site-to-Site VPN
Device Management
Group Policy
DfltGrpPolicy
DfltGrpPolicy
GP_David
Apply
Reset

Edit IPsec Remote Access Connection Profile: David

Basic
Advanced

Name: David

IKE Peer Authentication
☐ Preshared Key:
☑ Enable Certificate Authentication
☐ Enable peer authentication using EAP (If this is enabled, only Certificate is allowed for Local Authentication)
☐ Send an EAP identity request to the client

IKE Local Authentication
☑ Enable local authentication
○ Preshared Key:
● Certificate: Headend:hostname=Connected_2_INET-B, cn=HeadEnd.da... Manage...

User Authentication
Server Group: LOCAL Manage...
Fallback: ☐ Use LOCAL if Server Group fails

Client Address Assignment
DHCP Servers:
● None ○ DHCP Link ○ DHCP Subnet
Client Address Pools: ACPool Select...

Default Group Policy
Group Policy: GP_David Manage...
(Following field is an attribute of the group policy selected above.)
☑ Enable IKEv2 Protocol

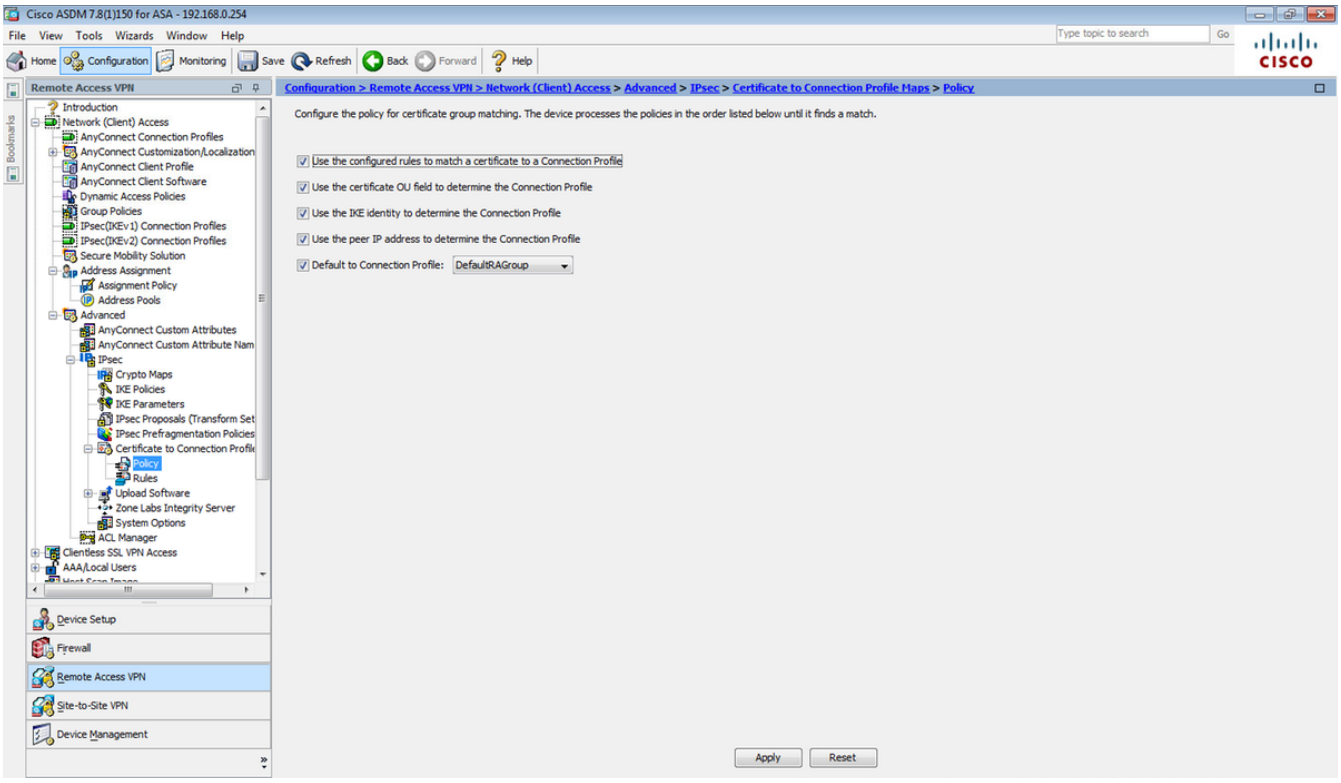
Find: Next Previous

OK Cancel Help

CLI

```
tunnel-group David type remote-access
tunnel-group David general-attributes
 address-pool ACPool
 default-group-policy GP_David
 authentication-server-group LOCAL
tunnel-group David webvpn-attributes
 authentication certificate
tunnel-group David ipsec-attributes
 ikev2 remote-authentication certificate
 ikev2 local-authentication certificate HeadEnd
```

ステップ7:[Configuration] > [Remote Access VPN] > [Network (Client) Access] > [Advanced] > [IPsec] > [Certificate to Connection Profile maps] > [Policy]に移動し、[Used the configured rules to math a certificate to a Connection Profile]ボックスをオンにします。



Configuration > Remote Access VPN > Network (Client) Access > Advanced > IPsec > Certificate to Connection Profile Maps > Policy

Configure the policy for certificate group matching. The device processes the policies in the order listed below until it finds a match.

☑ Use the configured rules to match a certificate to a Connection Profile

☑ Use the certificate OU field to determine the Connection Profile

☑ Use the IKE identity to determine the Connection Profile

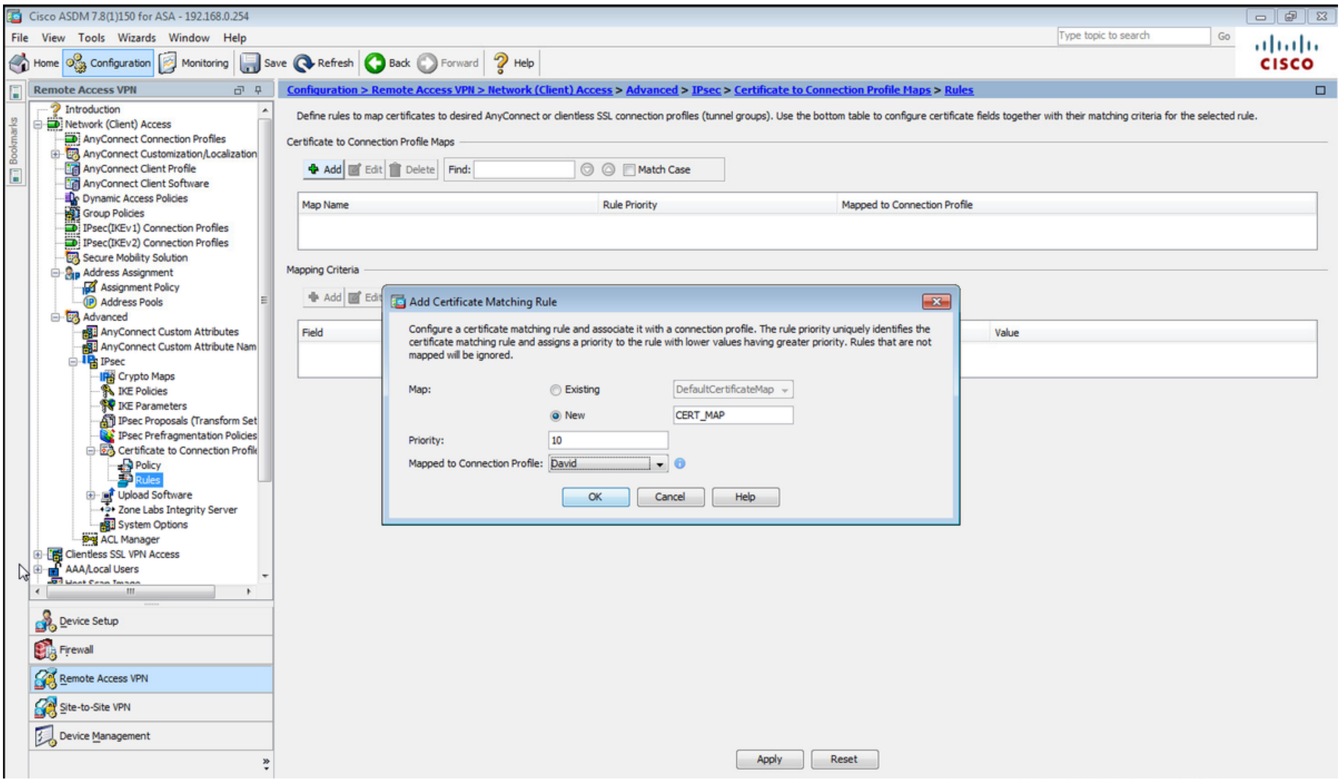
☑ Use the peer IP address to determine the Connection Profile

☑ Default to Connection Profile: DefaultRAGroup

CLI

```
tunnel-group-map enable rules
```

ステップ8:[Configuration] > [Remote Access VPN] > [Network (Client) Access] > [Advanced] > [IPsec] > [Certificate to Connection Profile maps] > [Rules]に移動し、新しい証明書マップを作成します。[Add]を選択し、トンネルグループにします。この例では、トンネルグループの名前はDavidです。



Configuration > Remote Access VPN > Network (Client) Access > Advanced > IPsec > Certificate to Connection Profile Maps > Rules

Define rules to map certificates to desired AnyConnect or clientless SSL connection profiles (tunnel groups). Use the bottom table to configure certificate fields together with their matching criteria for the selected rule.

Add Certificate Matching Rule

Configure a certificate matching rule and associate it with a connection profile. The rule priority uniquely identifies the certificate matching rule and assigns a priority to the rule with lower values having greater priority. Rules that are not mapped will be ignored.

Map: ○ Existing DefaultCertificateMap
● New CERT_MAP

Priority: 10

Mapped to Connection Profile: David

CLI

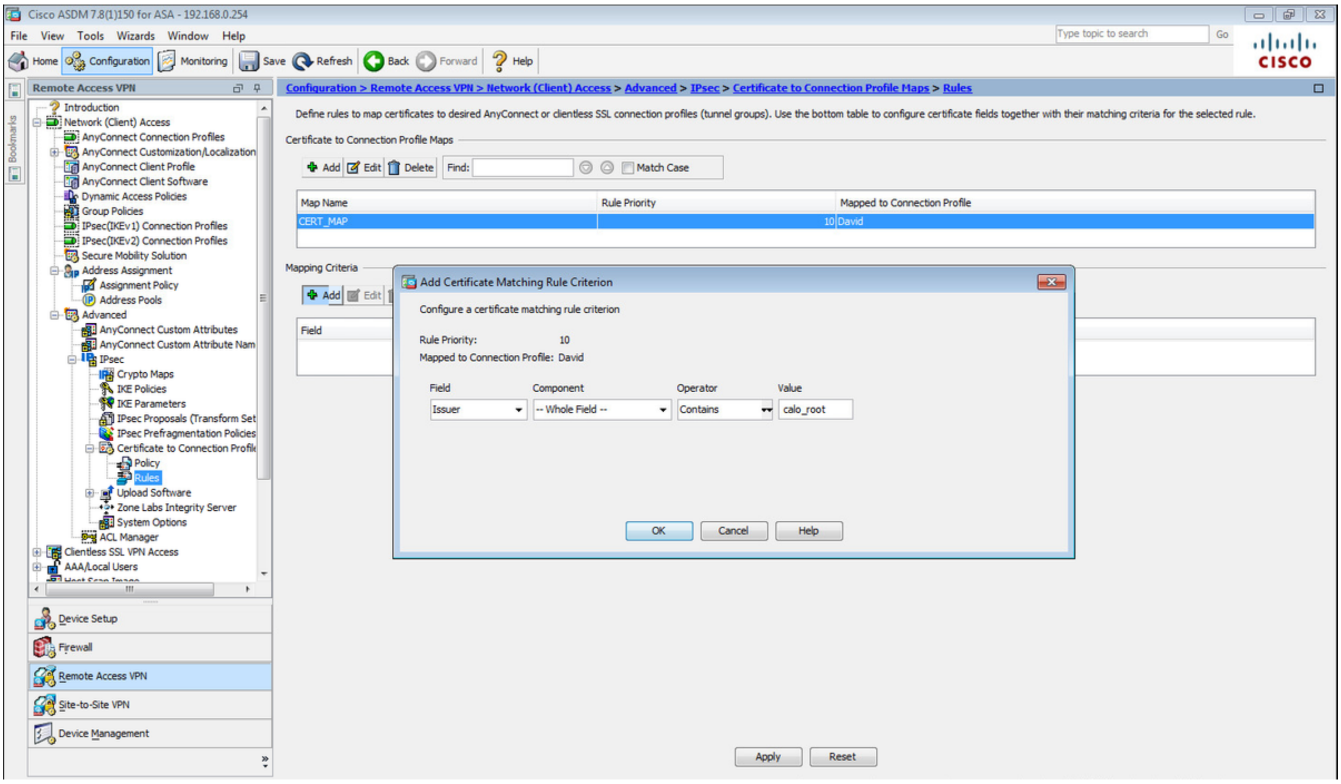
```
tunnel-group-map CERT_MAP 10 David
```

ステップ9:[マッピング基準]セクションで[追加]を選択し、これらの値を入力します。

Field：Issuer

Operator：含む

[Value]：calo_root



Cisco ASDM 7.8(1)150 for ASA - 192.168.0.254

Configuration > Remote Access VPN > Network (Client) Access > Advanced > IPsec > Certificate to Connection Profile Maps > Rules

Define rules to map certificates to desired AnyConnect or clientless SSL connection profiles (tunnel groups). Use the bottom table to configure certificate fields together with their matching criteria for the selected rule.

Certificate to Connection Profile Maps

Map Name	Rule Priority	Mapped to Connection Profile
CERT_MAP	10	David

Add Certificate Matching Rule Criterion

Configure a certificate matching rule criterion

Rule Priority: 10

Mapped to Connection Profile: David

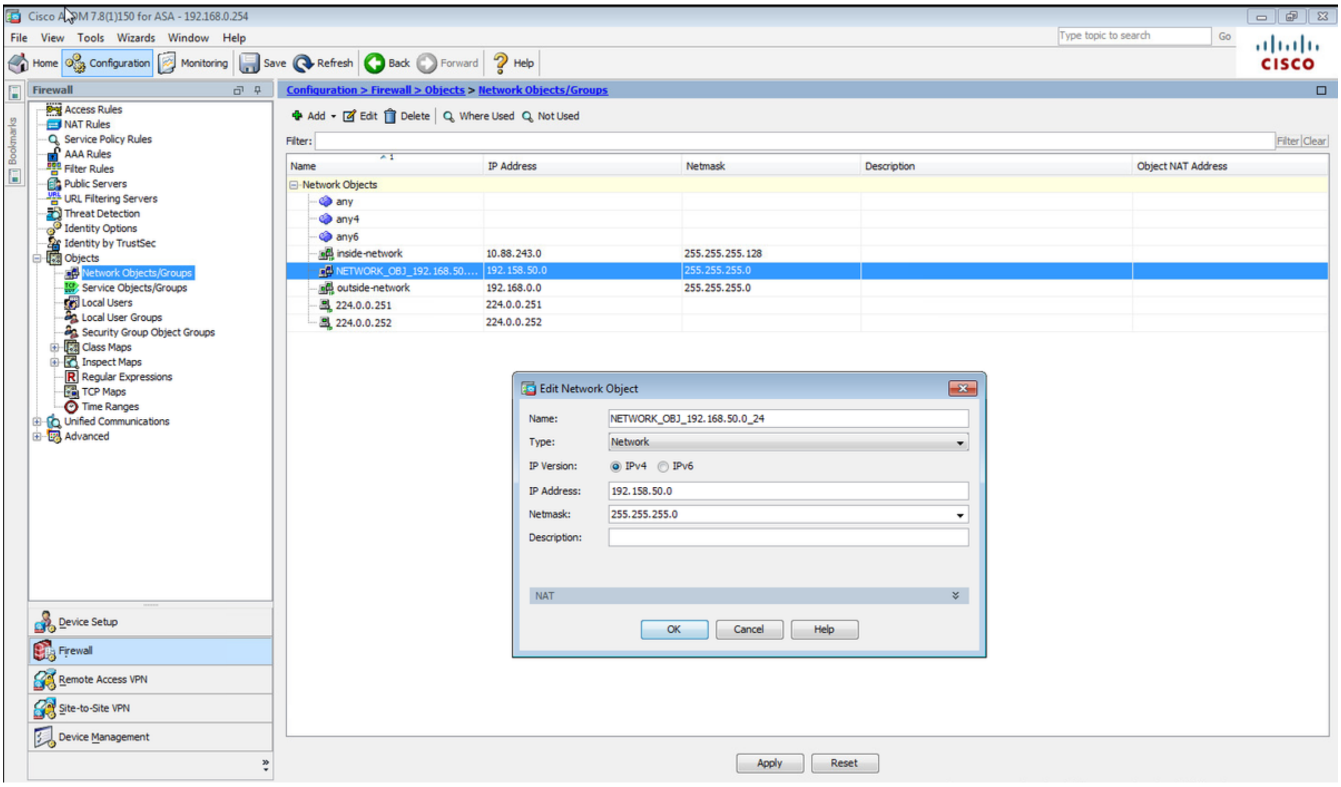
Field	Component	Operator	Value
Issuer	-- Whole Field --	Contains	calo_root

File View Tools Wizards Window Help
Home Configuration Monitoring Save Refresh Back Forward Help
Remote Access VPN
Introduction
Network (Client) Access
AnyConnect Connection Profiles
AnyConnect Customization/Localization
AnyConnect Client Profile
AnyConnect Client Software
Dynamic Access Policies
Group Policies
IPsec(IKEv1) Connection Profiles
IPsec(IKEv2) Connection Profiles
Secure Mobility Solution
Address Assignment
Assignment Policy
Address Pools
Advanced
AnyConnect Custom Attributes
AnyConnect Custom Attribute Nam
IPsec
Crypto Maps
IKE Policies
IKE Parameters
IPsec Proposals (Transform Set
IPsec Prefragmentation Policies
Certificate to Connection Profil
Policy
Rules
Upload Software
Zone Labs Integrity Server
System Options
ACL Manager
Clientless SSL VPN Access
AAA/Local Users
Device Setup
Firewall
Remote Access VPN
Site-to-Site VPN
Device Management
Add Edit Delete Find: Match Case
Mapping Criteria
Field
OK Cancel Help
Apply Reset

CLI

```
crypto ca certificate map CERT_MAP 10
 issuer-name co calo_root
```

ステップ10:[Configuration] > [Firewall] > [Objects] > [Network Objects/Groups] > [Add]で（ネットワークアドレス変換）NAT除外ルールを追加するために使用するIPプールネットワークを持つオブジェクトを作成します。



Name	IP Address	Netmask	Description	Object NAT Address
Network Objects				
any				
any4				
any6				
inside-network	10.88.243.0	255.255.255.128		
NETWORK_OBJ_192.168.50....	192.158.50.0	255.255.255.0		
outside-network	192.168.0.0	255.255.255.0		
224.0.0.251	224.0.0.251			
224.0.0.252	224.0.0.252			

Edit Network Object

Name: NETWORK_OBJ_192.168.50.0_24

Type: Network

IP Version: ● IPv4 ○ IPv6

IP Address: 192.158.50.0

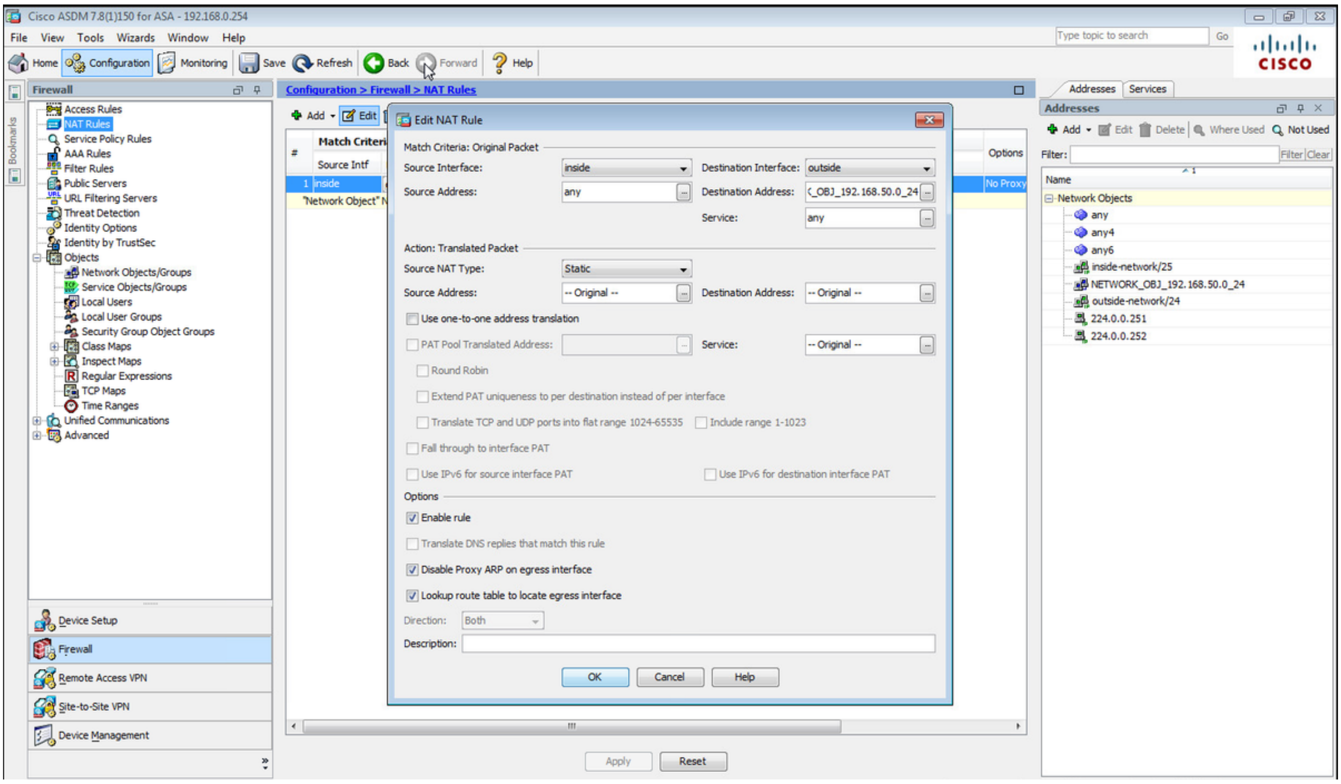
Netmask: 255.255.255.0

Description:

CLI

```
object network NETWORK_OBJ_192.168.50.0_24
 subnet 192.168.50.0 255.255.255.0
```

ステップ11:[Configuration] > [Firewall] > [NAT Rules]に移動し、[Add]を選択してRA VPNトラフィックのNAT除外ルールを作成します。



Edit NAT Rule

Match Criteria: Original Packet

Source Interface: inside　Destination Interface: outside

Source Address: any　Destination Address: _OBJ_192.168.50.0_24

Service: any

Action: Translated Packet

Source NAT Type: Static

Source Address: -- Original --　Destination Address: -- Original --

□ Use one-to-one address translation

□ PAT Pool Translated Address:　Service: -- Original --

□ Round Robin

□ Extend PAT uniqueness to per destination instead of per interface

□ Translate TCP and UDP ports into flat range 1024-65535 □ Include range 1-1023

□ Fall through to interface PAT

□ Use IPv6 for source interface PAT □ Use IPv6 for destination interface PAT

Options

☑ Enable rule

□ Translate DNS replies that match this rule

☑ Disable Proxy ARP on egress interface

☑ Lookup route table to locate egress interface

Direction: Both

Description:

CLI

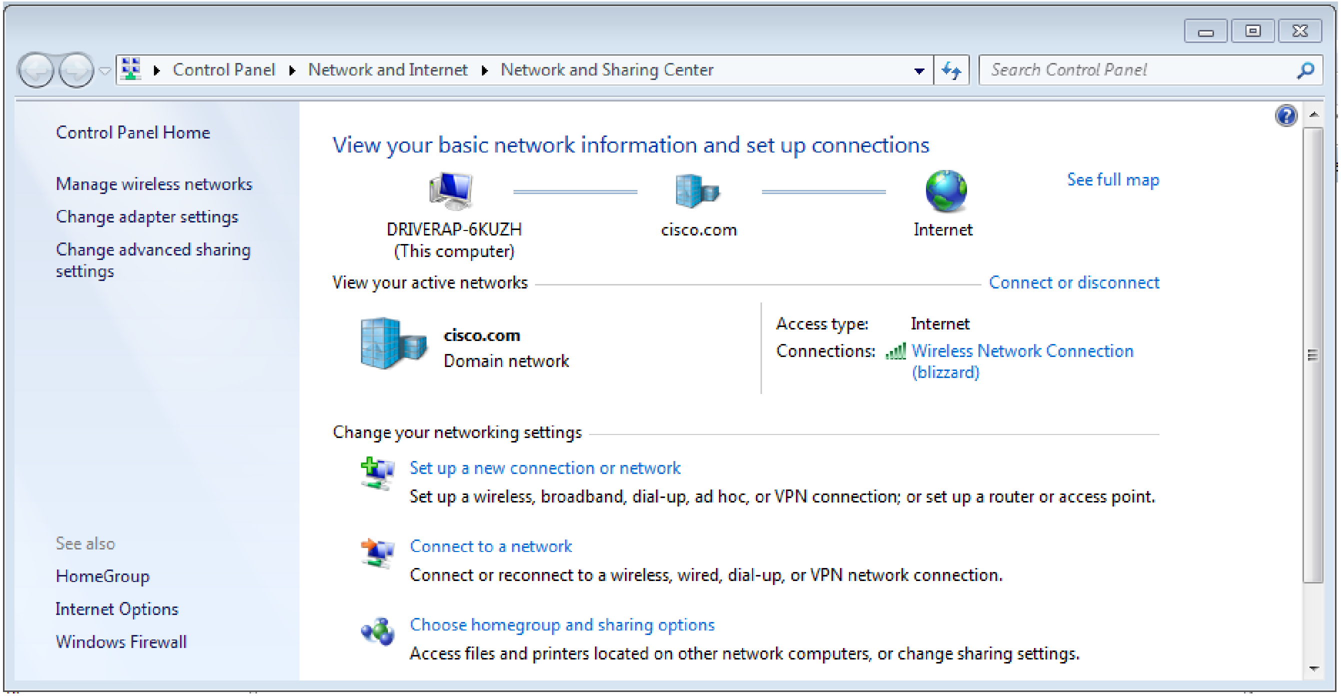
```
nat (inside,outside) source static any any destination static NETWORK_OBJ_192.168.50.0_24
NETWORK_OBJ_192.168.50.0_24 no-proxy-arp route-lookup
```

次に、この例で使用する完全なASA設定を示します。

```
interface GigabitEthernet1/1
 nameif outside
 security-level 0
 ip address 10.88.243.108 255.255.255.128

object network NETWORK_OBJ_192.168.50.0_24
 subnet 192.168.50.0 255.255.255.0
nat (inside,outside) source static any any destination static NETWORK_OBJ_192.168.50.0_24
NETWORK_OBJ_192.168.50.0_24
ip local pool ACPool 192.168.50.1-192.168.50.100 mask 255.255.255.0
crypto ikev2 policy 1
 encryption aes-256
 integrity sha
 group 5
 prf sha
 lifetime seconds 86400
crypto ikev2 enable outside

crypto ikev2 remote-access trustpoint HeadEnd

group-policy GP_David internal
group-policy GP_David attributes
 vpn-tunnel-protocol ikev2

tunnel-group David type remote-access
tunnel-group David general-attributes
 address-pool ACPool
 default-group-policy GP_David
 authentication-server-group LOCAL
tunnel-group David webvpn-attributes
 authentication certificate
tunnel-group David ipsec-attributes
 ikev2 remote-authentication certificate
 ikev2 local-authentication certificate HeadEnd

tunnel-group-map enable rules
crypto ca certificate map CERT_MAP 10
 issuer-name co calo_root
tunnel-group-map CERT_MAP 10 David

crypto ipsec ikev2 ipsec-proposal AES256
 protocol esp encryption aes-256
 protocol esp integrity sha-1 md5

crypto dynamic-map Anyconnect 65535 set ikev2 ipsec-proposal AES256
crypto map outside_map 65535 ipsec-isakmp dynamic Anyconnect
crypto map outside_map interface outside
```

Windows 7 組み込みクライアントの設定

ステップ1:[コントロールパネル] > [ネットワークとインターネット] > [ネットワークと共有センター]に移動します。


Control Panel ▸ Network and Internet ▸ Network and Sharing Center
Search Control Panel

Control Panel Home

Manage wireless networks

Change adapter settings

Change advanced sharing settings

See also

HomeGroup

Internet Options

Windows Firewall

View your basic network information and set up connections

View your active networks — Connect or disconnect

cisco.com
Domain network

Access type: Internet
Connections: Wireless Network Connection (blizzard)

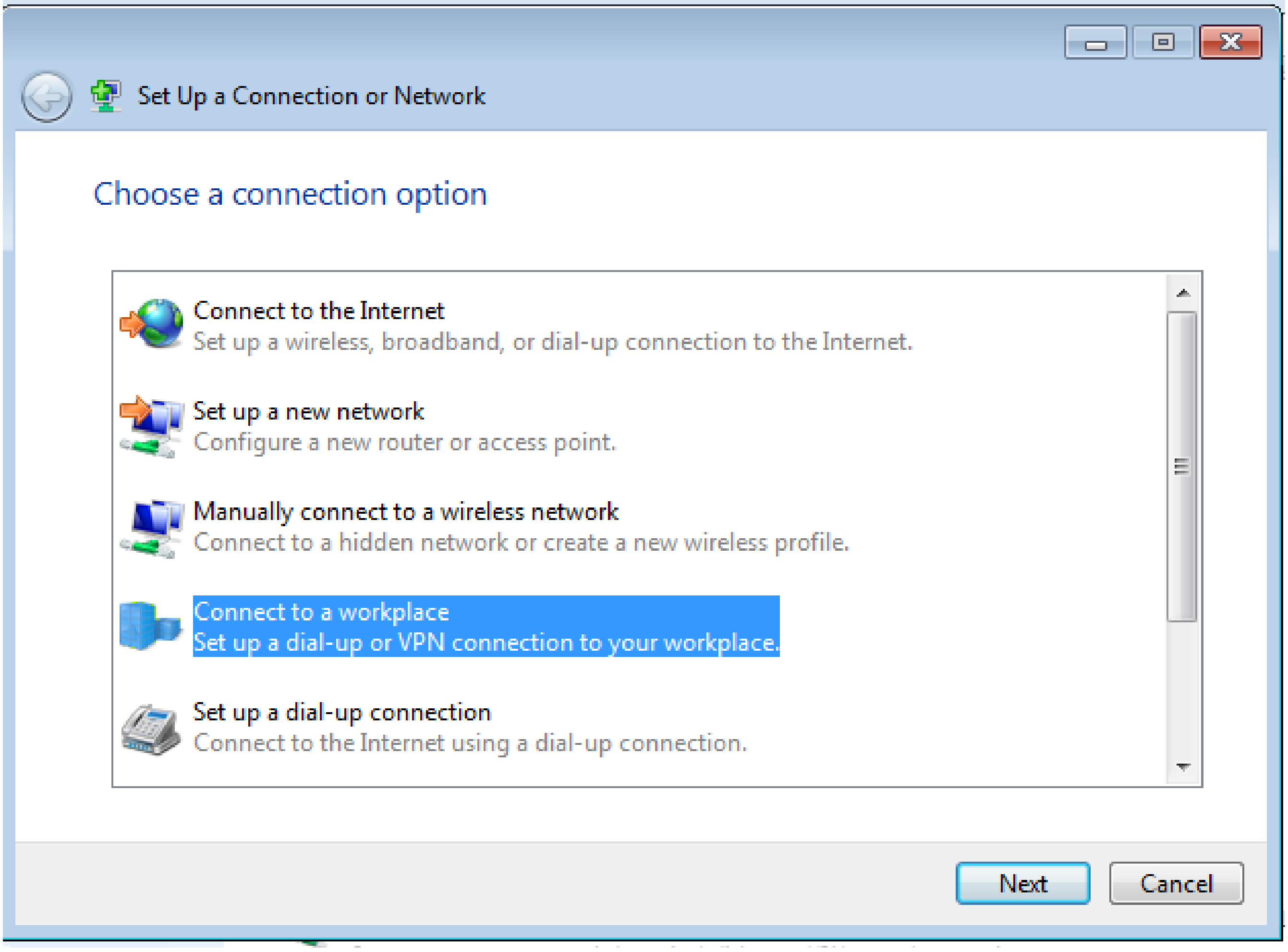
Change your networking settings

Set up a new connection or network
Set up a wireless, broadband, dial-up, ad hoc, or VPN connection; or set up a router or access point.

Connect to a network
Connect or reconnect to a wireless, wired, dial-up, or VPN network connection.

Choose homegroup and sharing options
Access files and printers located on other network computers, or change sharing settings.

ステップ2:[Set up a **new connection or network]を選択します。**



Choose a connection option

Connect to the Internet
Set up a wireless, broadband, or dial-up connection to the Internet.

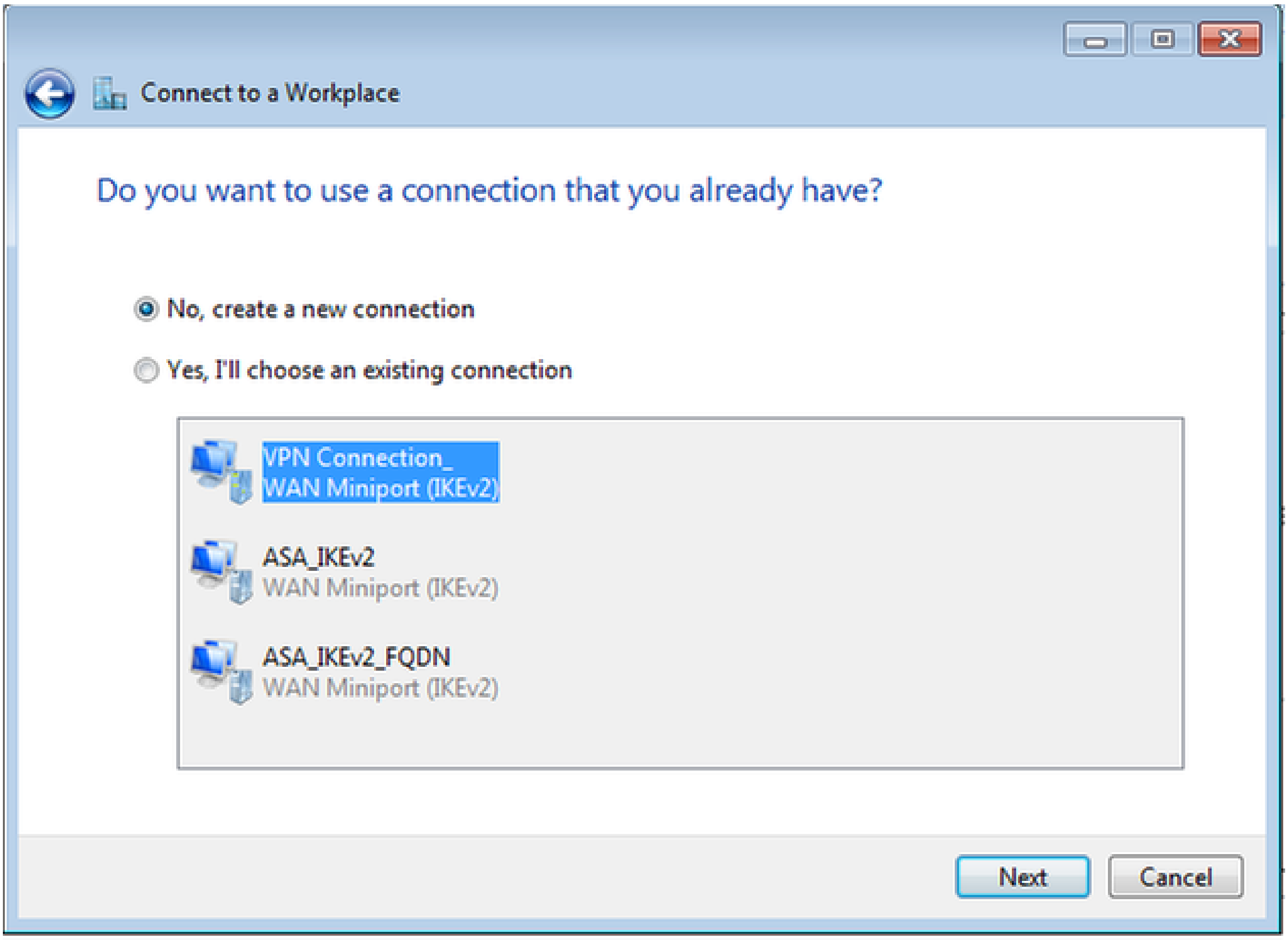
Set up a new network
Configure a new router or access point.

Manually connect to a wireless network
Connect to a hidden network or create a new wireless profile.

Connect to a workplace
Set up a dial-up or VPN connection to your workplace.

Set up a dial-up connection
Connect to the Internet using a dial-up connection.

ステップ3:[Connect to a workplace]**と[Next]を選択します。**



Connect to a Workplace

Do you want to use a connection that you already have?

● No, create a new connection

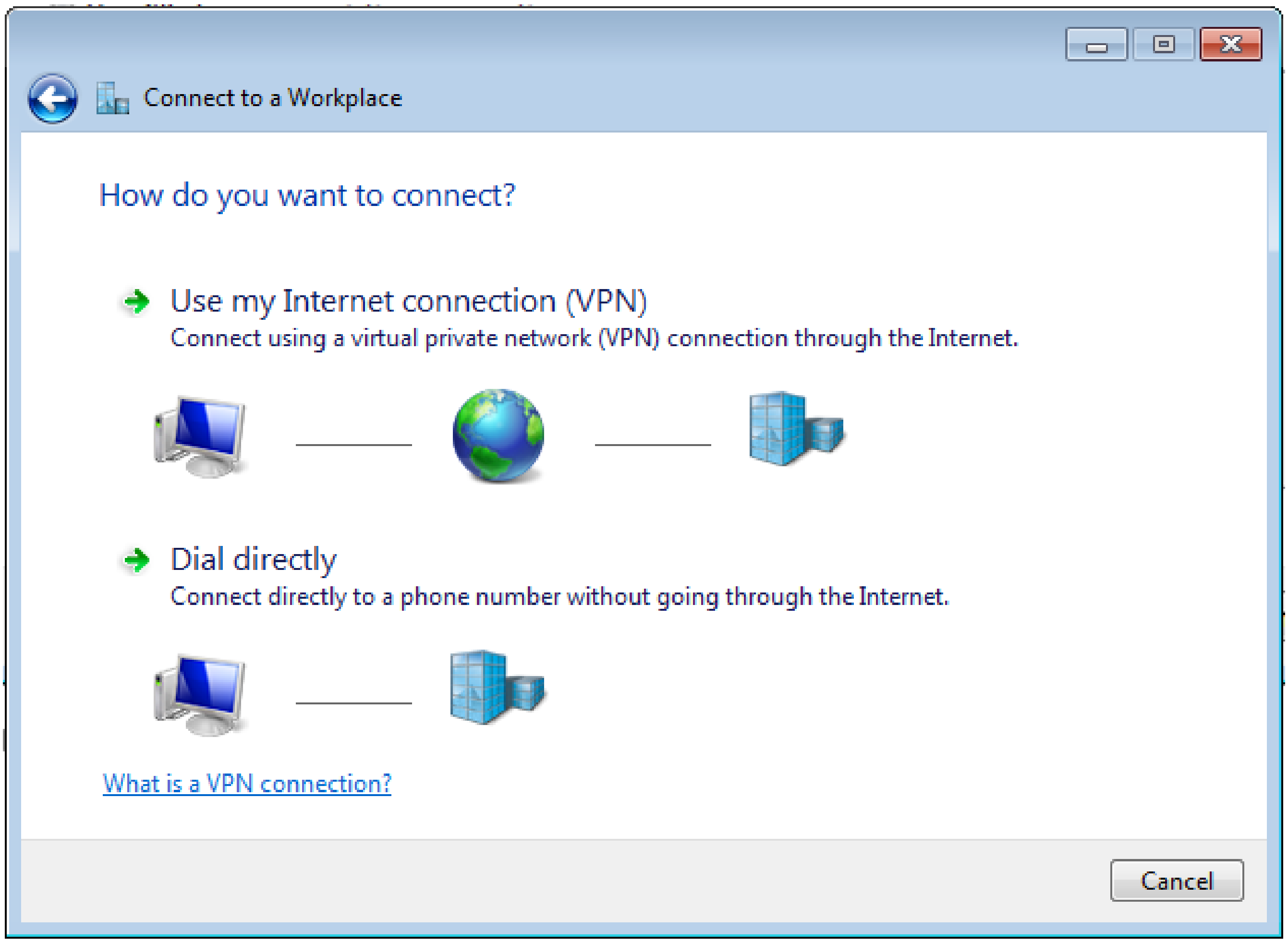
○ Yes, I'll choose an existing connection

VPN Connection_
WAN Miniport (IKEv2)

ASA_IKEv2
WAN Miniport (IKEv2)

ASA_IKEv2_FQDN
WAN Miniport (IKEv2)

ステップ4:[No]を選択し、新しい接続を作成し、[Next]を選択します。



Connect to a Workplace

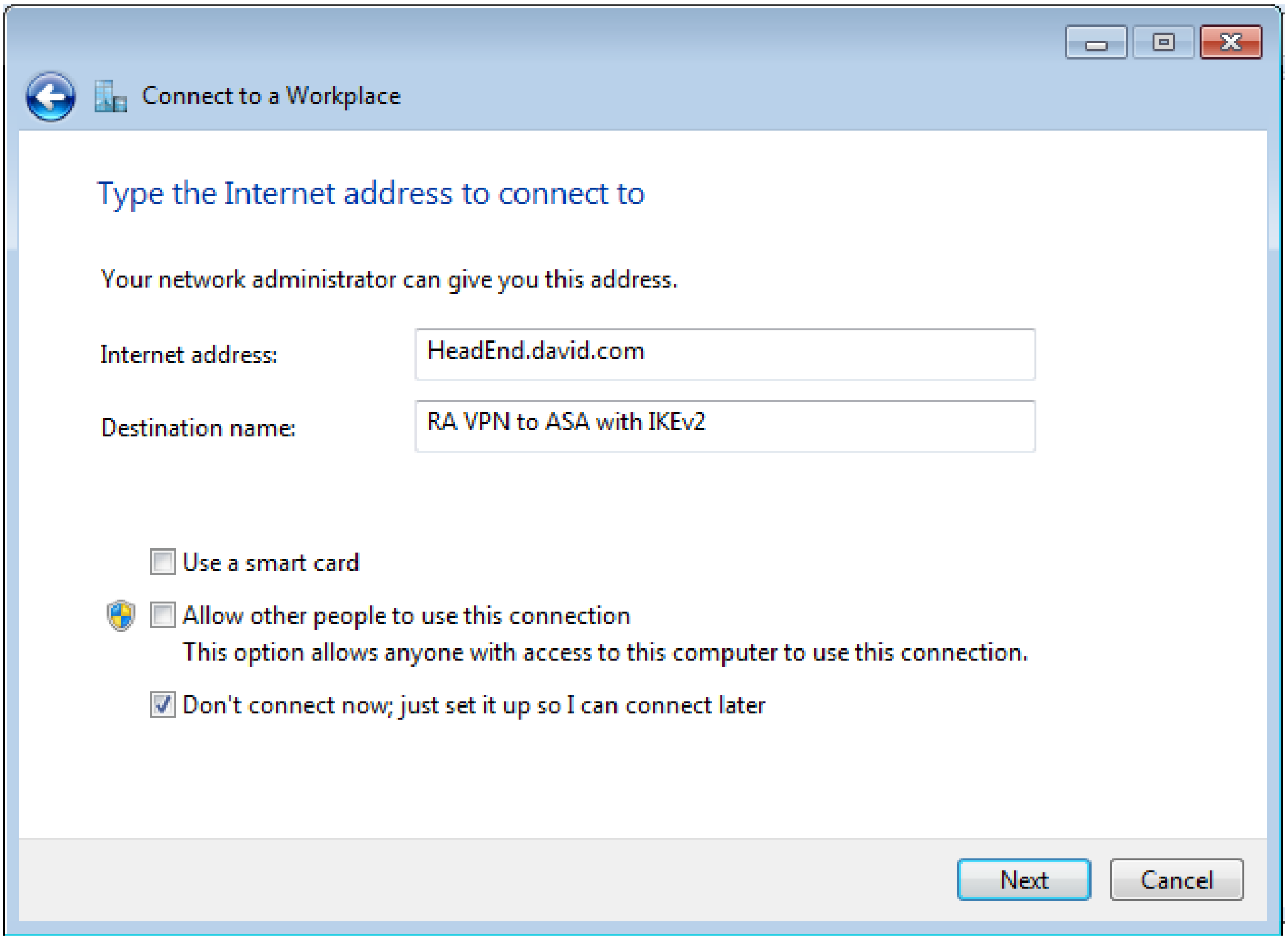
How do you want to connect?

Use my Internet connection (VPN)
Connect using a virtual private network (VPN) connection through the Internet.

Dial directly
Connect directly to a phone number without going through the Internet.

What is a VPN connection?

ステップ5:**[Use my Internet connection (VPN)]を選択**し、[Internet address]フィールドにヘッドエンド証明書共通名(CN)文字列を**追加します。**[接続先**名]フィールド**に接続名を入力します。任意の文字列を指定できます。「**Don't connect now;後で接続できるようにセットアップします。**



Type the Internet address to connect to

Your network administrator can give you this address.

Internet address: HeadEnd.david.com

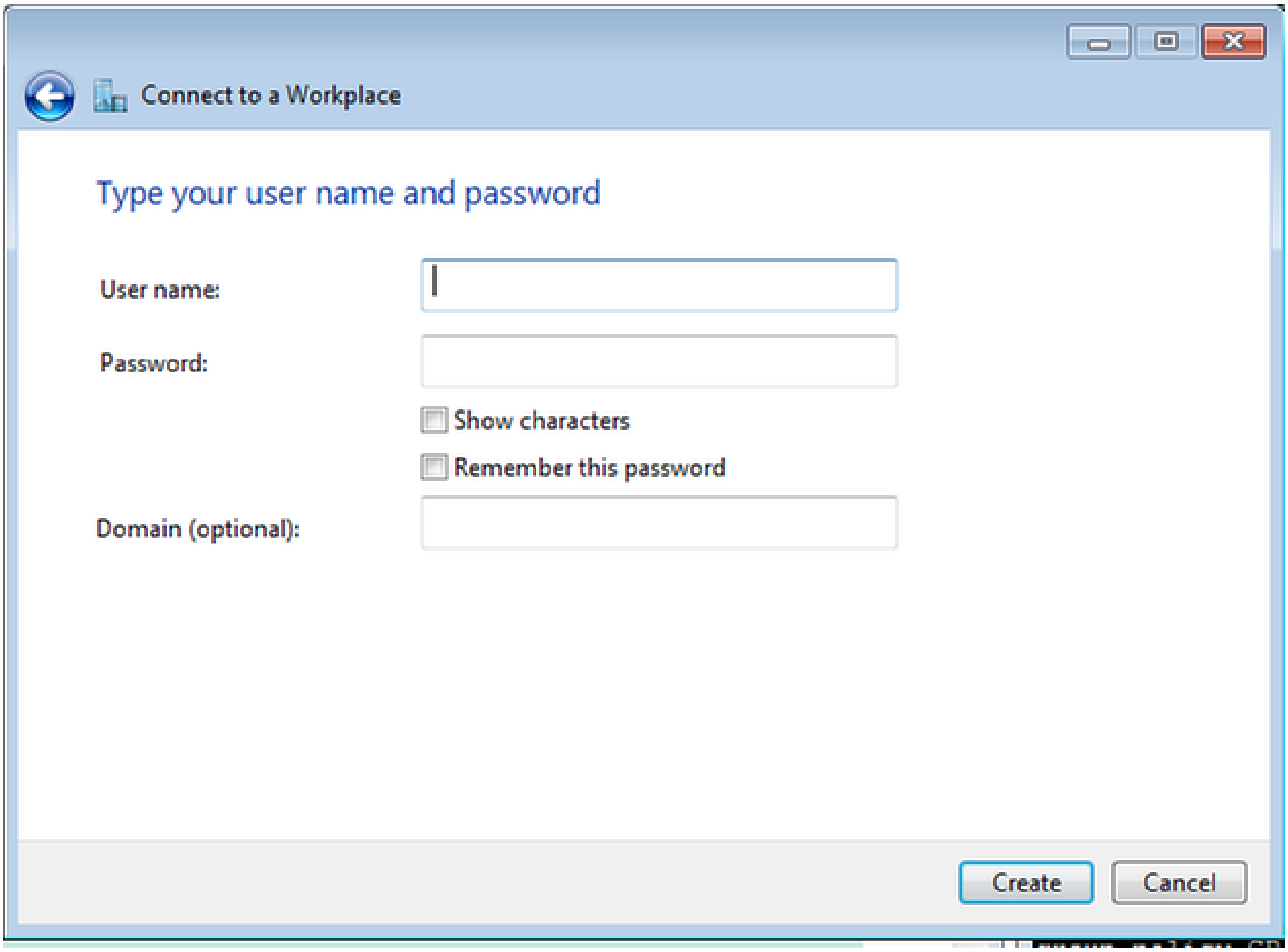
Destination name: RA VPN to ASA with IKEv2

□ Use a smart card

□ Allow other people to use this connection
This option allows anyone with access to this computer to use this connection.

☑ Don't connect now; just set it up so I can connect later

ステップ6:[Next]を選択します。



Type your user name and password

User name:

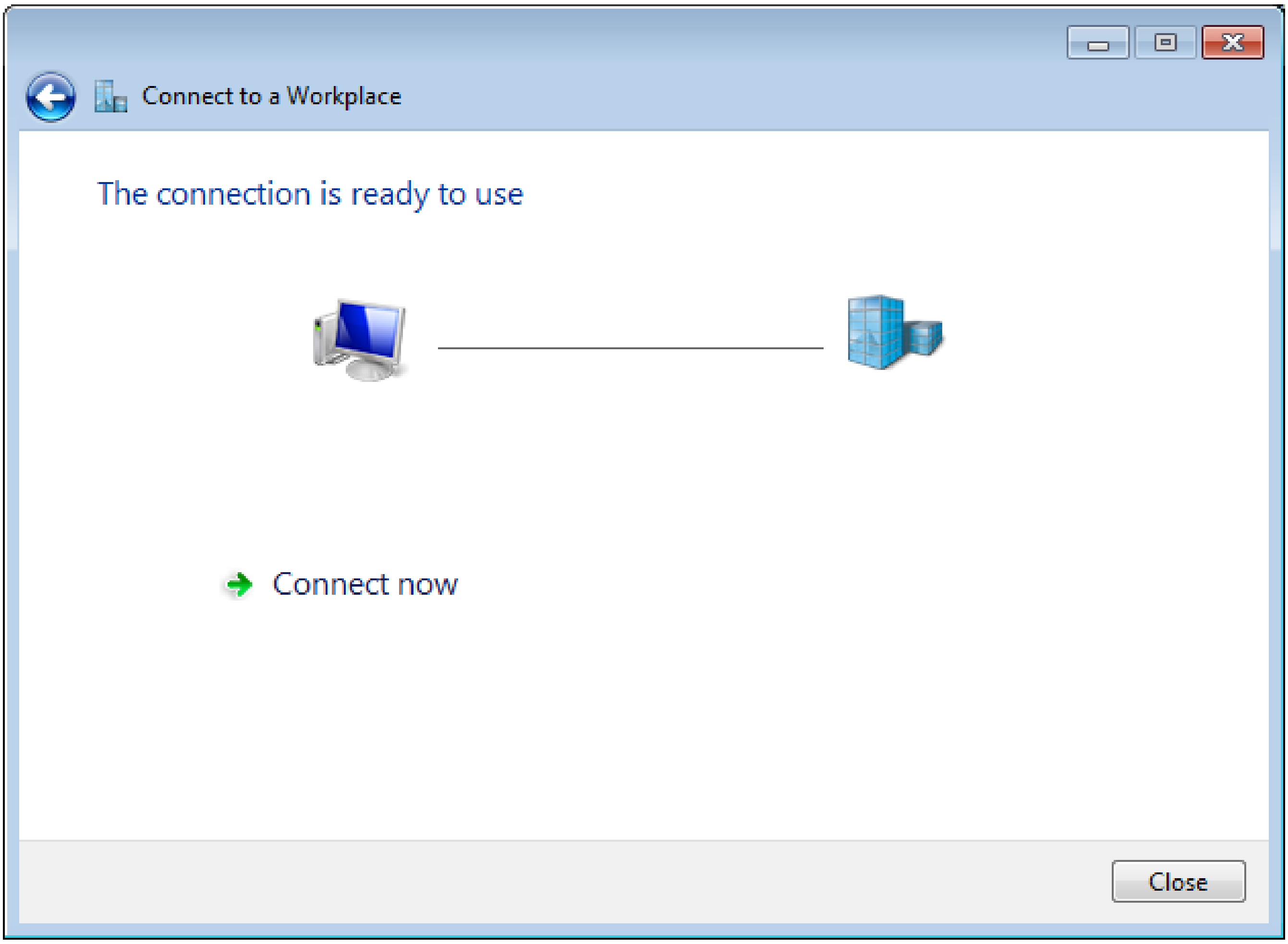
Password:

□ Show characters

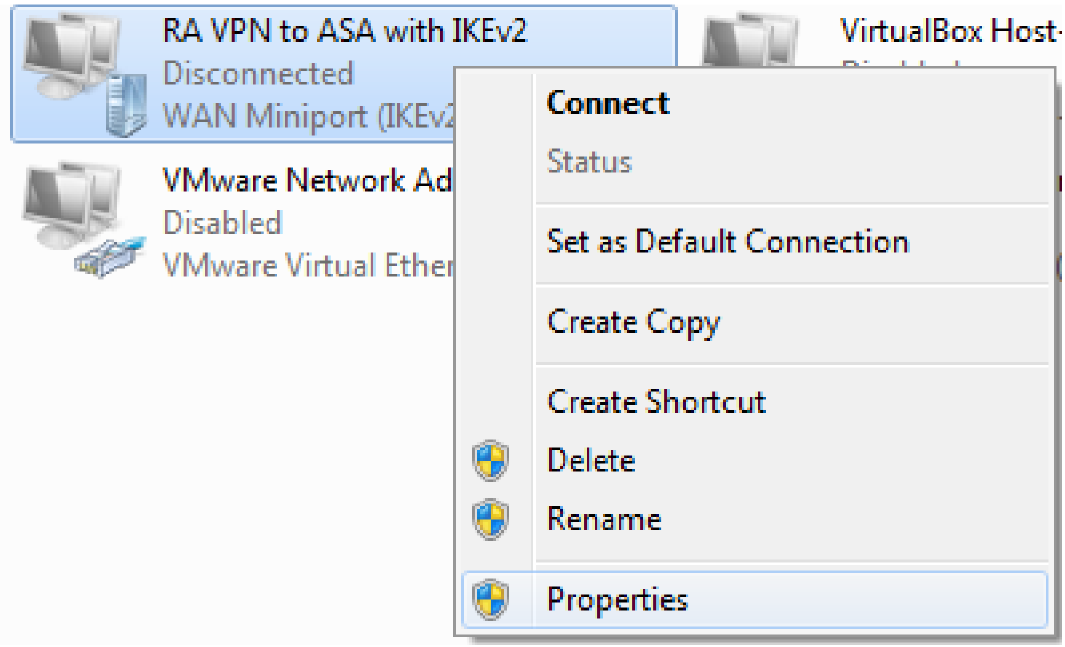
□ Remember this password

Domain (optional):

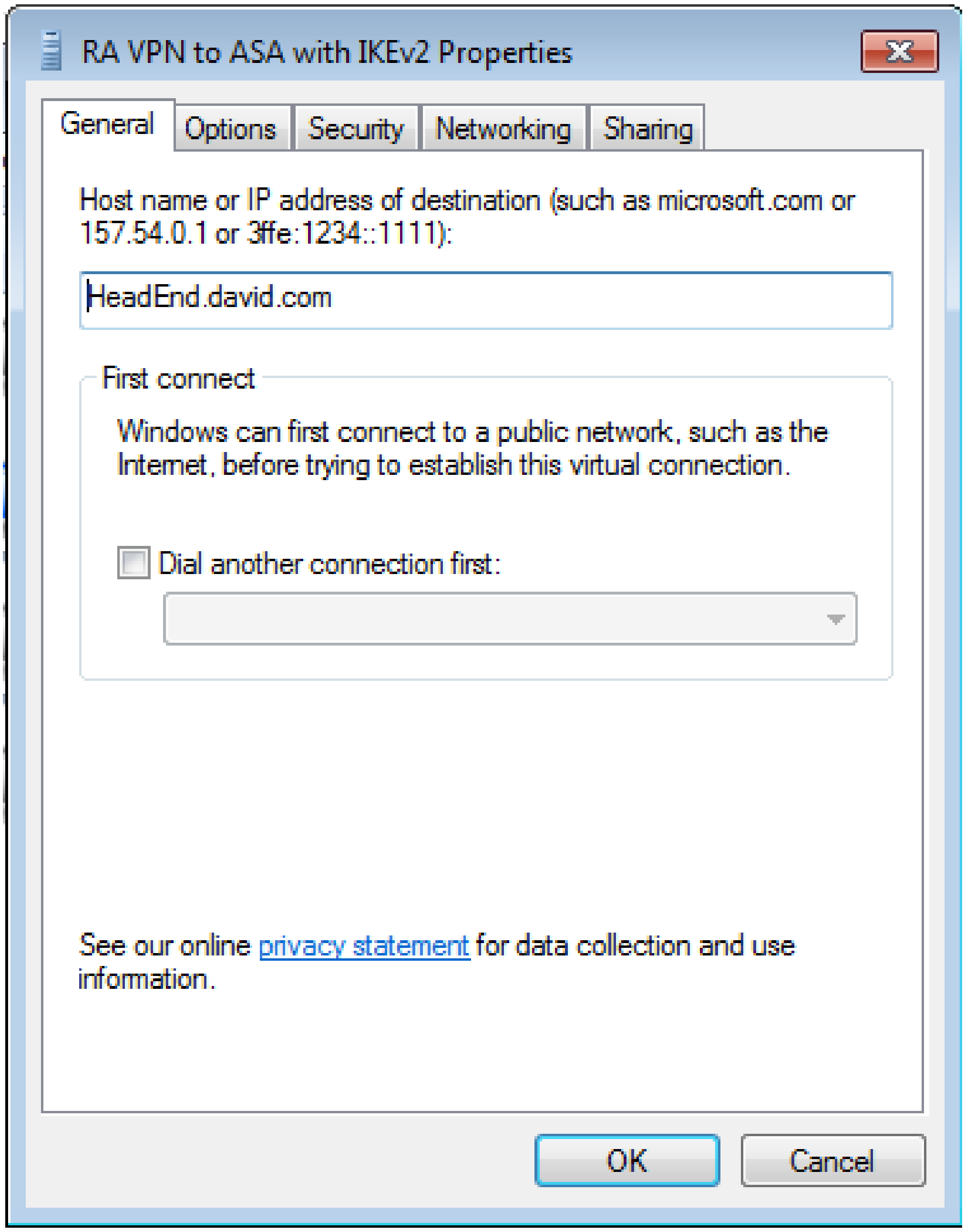
ステップ7:[Create]を選択します。



ステップ8:[閉じる]を選択し、**[コントロールパネル] > [ネットワークとインターネット] > [ネットワーク接続]に移動します**。作成したネットワーク接続を選択し、右クリックします。[Properties]を選択します。



ステップ9:[General] タブで、ヘッドエンドの適切なホスト名が正しいことを確認できます。コンピュータは、この名前をRA VPNユーザの接続に使用されるASA IPアドレスに解決します。



RA VPN to ASA with IKEv2 Properties

Host name or IP address of destination (such as microsoft.com or 157.54.0.1 or 3ffe:1234::1111):

HeadEnd.david.com

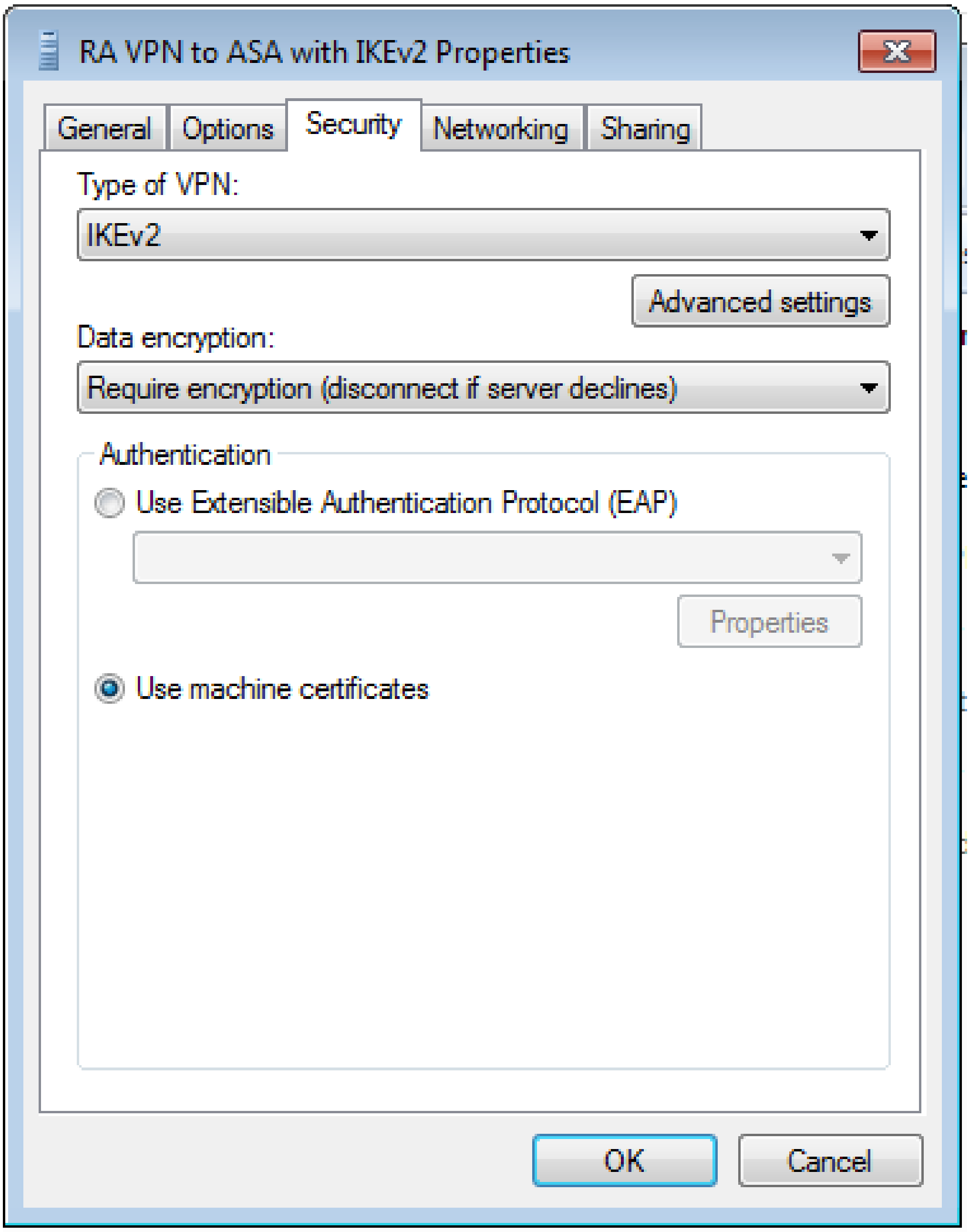
First connect

Windows can first connect to a public network, such as the Internet, before trying to establish this virtual connection.

□ Dial another connection first:

See our online privacy statement for data collection and use information.

ステップ10:[Security]タブに移動し、[Type of VPN]に[IKEv2]を選択します。[Authentication]セクションで[Use machine certificates]を選択します。



Type of VPN:
IKEv2

Data encryption:
Require encryption (disconnect if server declines)

Authentication

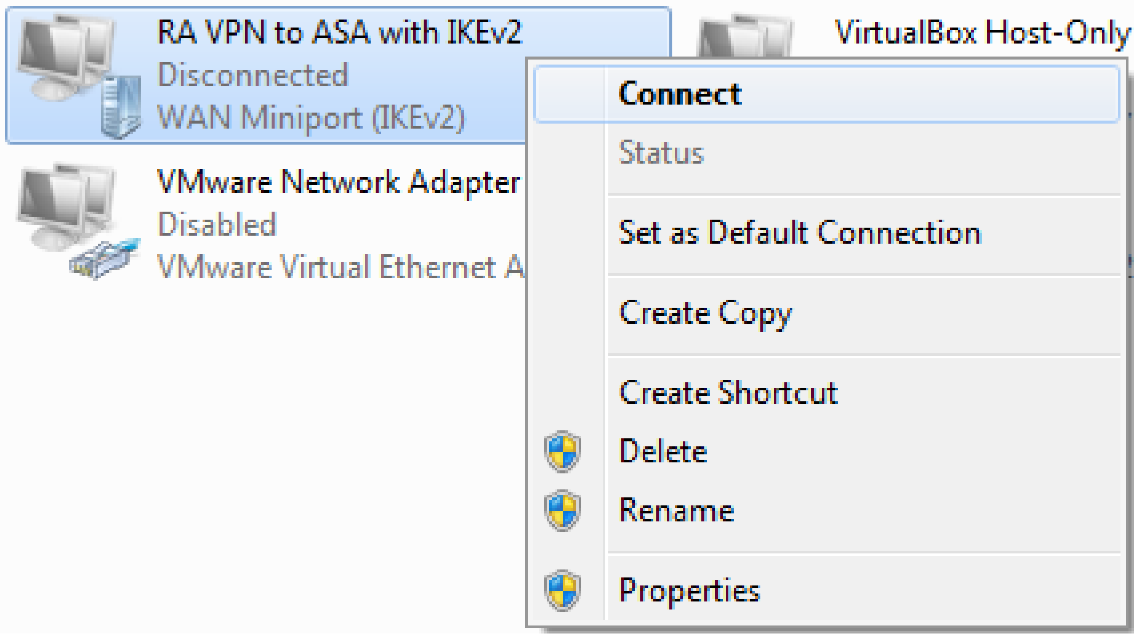
○ Use Extensible Authentication Protocol (EAP)

● Use machine certificates

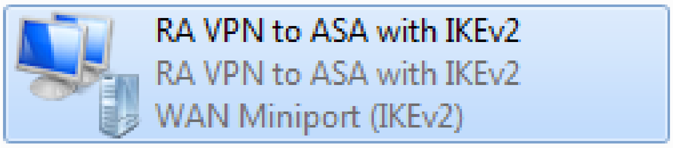
ステップ11:[OK]を選択して、C:\Windows\System32\drivers\etcに移動します。テキストエディタを使ってhostsファイルを開きます。ネットワーク接続で設定された（完全修飾ドメイン名）FQDNをASAヘッドエンドのIPアドレス（この例では外部インターフェイス）に解決するようにエントリを設定します。

```
# For example:
#
#      102.54.94.97     rhino.acme.com          # source server
#       38.25.63.10     x.acme.com              # x client host
10.88.243.108 HeadEnd.david.com
```

ステップ12:[Control Panel] > [Network and Internet] > [Network Connections]に戻ります。作成したネットワーク接続を選択します。これを右クリックし、[接続]を選択します。



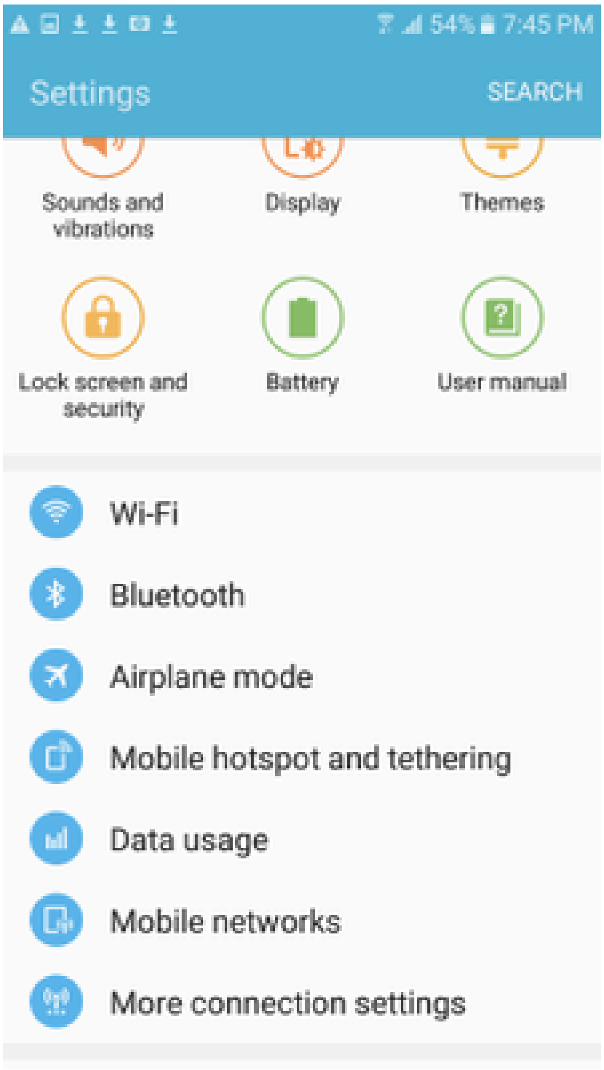
ステップ13：ネットワーク接続のステータスが[Disconnected]から[Connecting]に変わり、[Connected]に変わります。最後に、ネットワーク接続に指定した名前が表示されます。



この時点で、コンピュータはVPNヘッドエンドに接続されています。

AndroidネイティブVPNクライアントの設定

ステップ1:[Settings] > [More connection Settings] に移動します。



Settings

SEARCH

Sounds and vibrations

Display

Themes

Lock screen and security

Battery

User manual

Wi-Fi

Bluetooth

Airplane mode

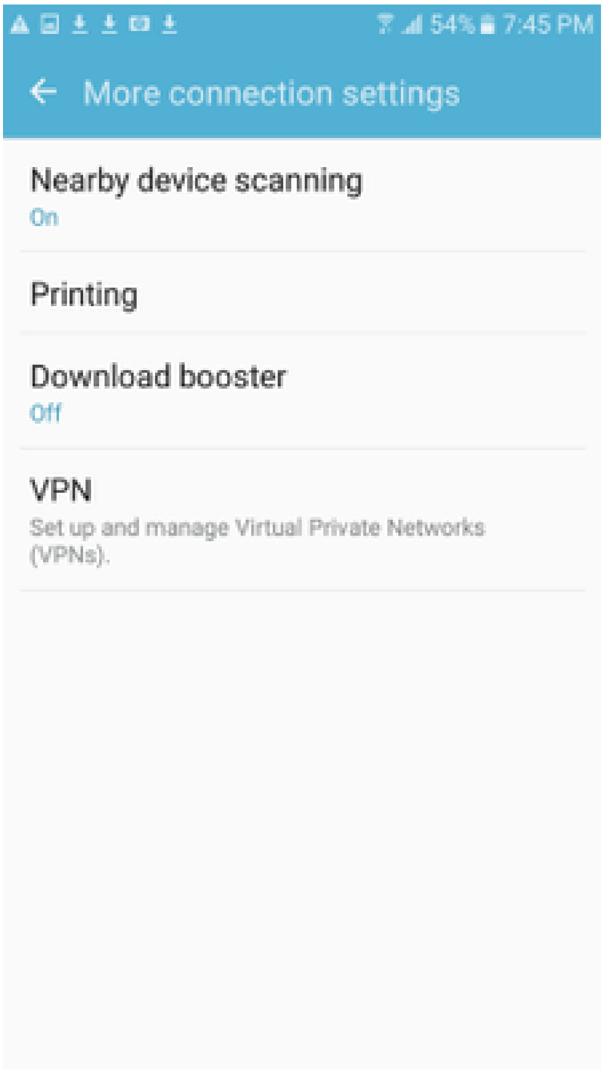
Mobile hotspot and tethering

Data usage

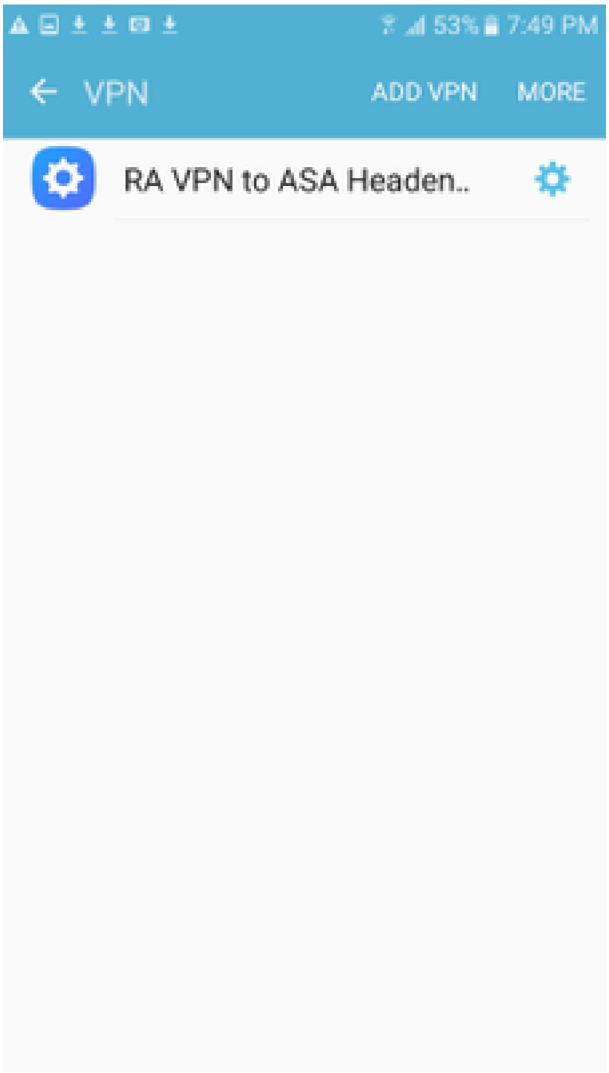
Mobile networks

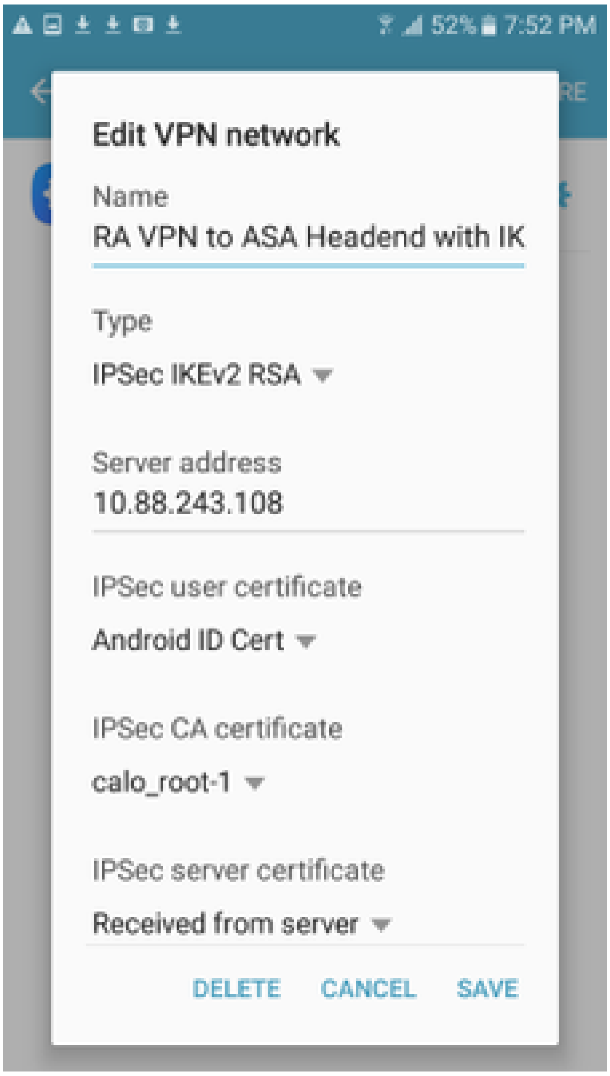
More connection settings

ステップ2:[VPN]を選択**します**



ステップ3:[Add VPN]を選択します。この例のように接続が既に作成されている場合は、エンジンアイコンをタップして編集します。タイプフィールドでIPSec IKEv2 RSAを指定します。Server addressは、IKEv2対応のASAインターフェイスのIPアドレスです。IPSecユーザ証明書とIPSec CA証明書の場合は、ドロップダウンメニューをタップしてインストールされた証明書を選択します。IPSecサーバ証明書はデフォルトオプションの[Received from server]のままにしてください。


53% 7:49 PM
VPN
ADD VPN
MORE
RA VPN to ASA Headen..



Edit VPN network

Name
RA VPN to ASA Headend with IK

Type
IPSec IKEv2 RSA

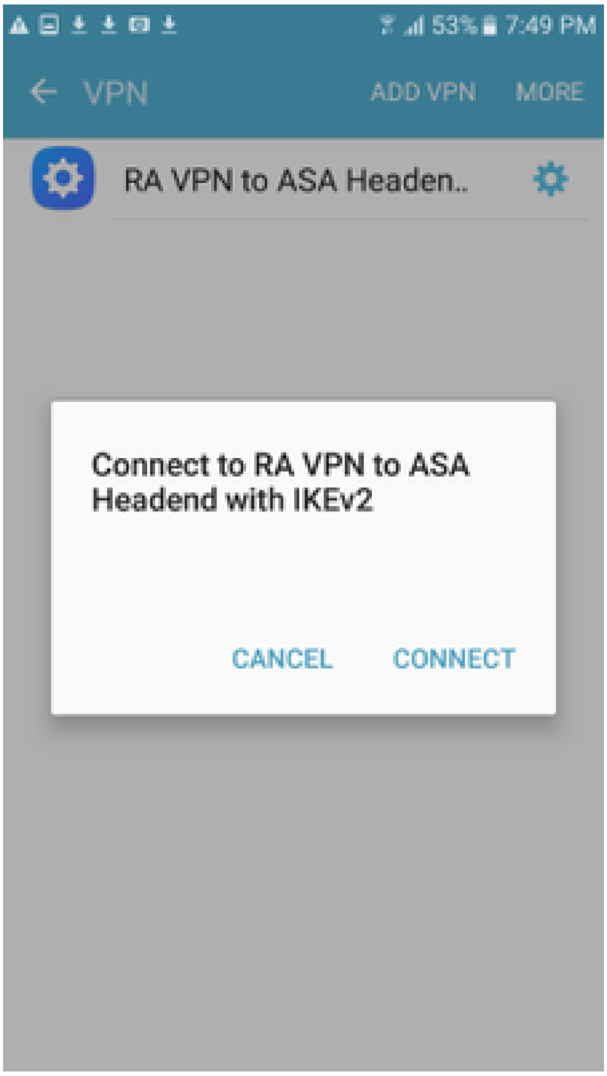
Server address
10.88.243.108

IPSec user certificate
Android ID Cert

IPSec CA certificate
calo_root-1

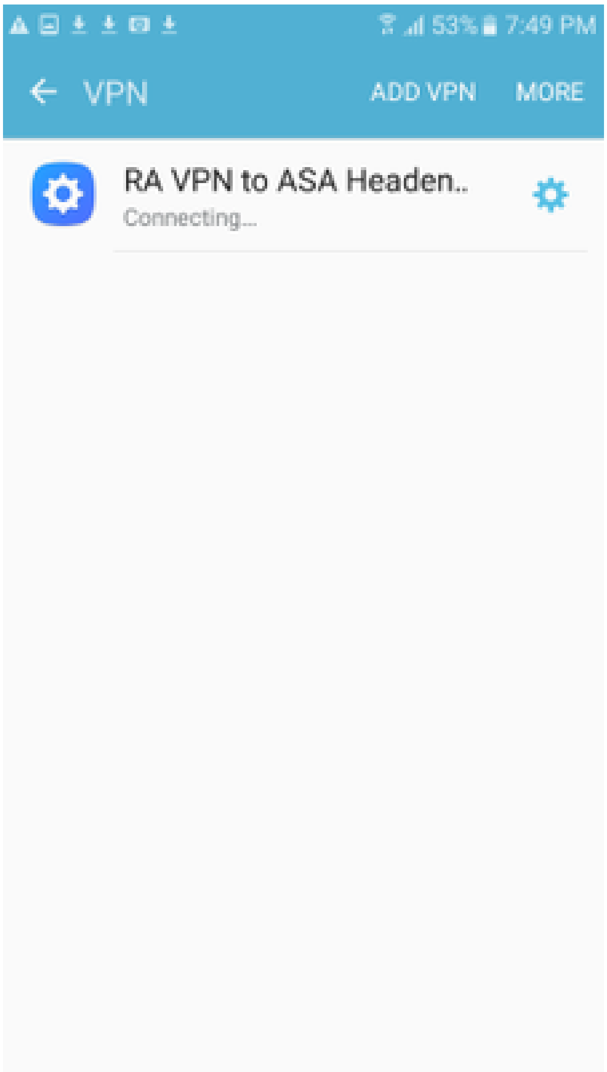
IPSec server certificate
Received from server

ステップ4:[**保存**]を選択し、新しいVPN接続の名前をタップします。



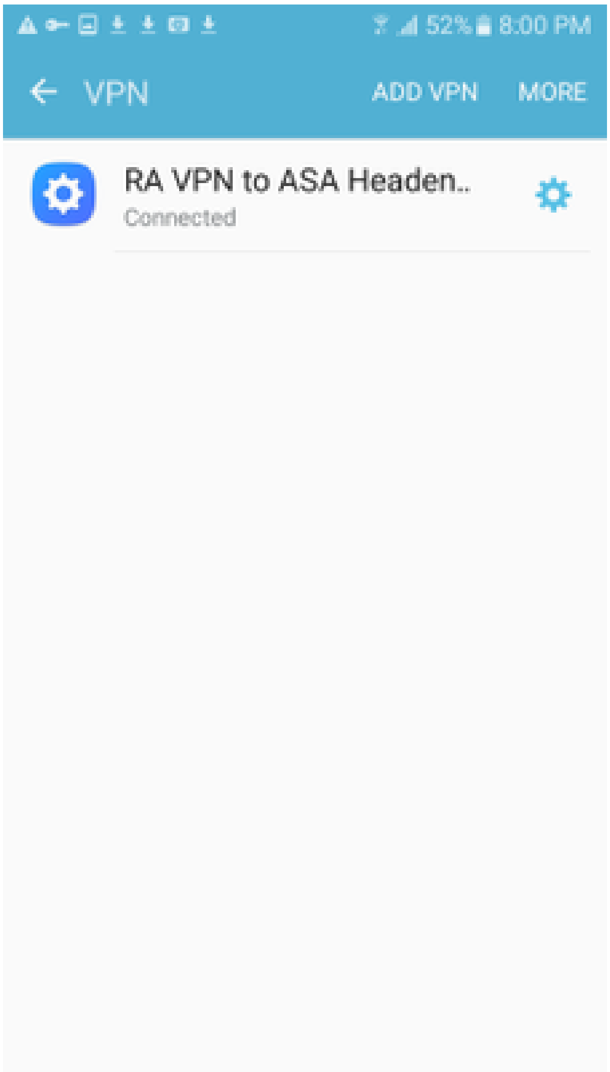
Connect to RA VPN to ASA Headend with IKEv2

ステップ5:[Connect]を選択**します。**



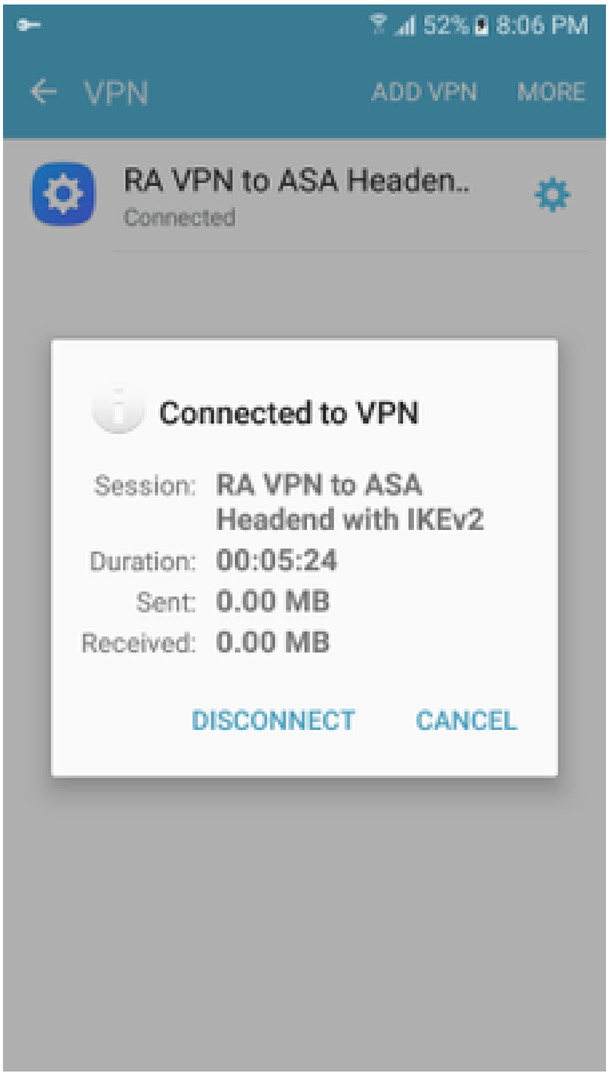
RA VPN to ASA Headen..

Connecting...



RA VPN to ASA Headen..
Connected

ステップ6:VPN接続をもう一度入力して、ステータスを確認します。[接続]と表示されます。



Connected to VPN

Session: RA VPN to ASA Headend with IKEv2

Duration: 00:05:24

Sent: 0.00 MB

Received: 0.00 MB

確認

ASAヘッドエンドでの確認コマンド：

```
ASA#show vpn-sessiondb detail ra-ikev2-ipsec
Session Type: Generic Remote-Access IKEv2 IPsec Detailed
Username     : Win7_PC.david.com      Index        : 24
Assigned IP  : 192.168.50.1           Public IP    : 10.152.206.175
Protocol     : IKEv2 IPsec
License      : AnyConnect Premium
Encryption   : IKEv2: (1)AES256  IPsec: (1)AES256
Hashing      : IKEv2: (1)SHA1  IPsec: (1)SHA1
Bytes Tx     : 0                      Bytes Rx     : 16770
Pkts Tx      : 0                      Pkts Rx      : 241
Pkts Tx Drop : 0                      Pkts Rx Drop : 0
Group Policy : GP_David               Tunnel Group : David
Login Time   : 08:00:01 UTC Tue Jul 18 2017
Duration     : 0h:00m:21s
Inactivity   : 0h:00m:00s
VLAN Mapping : N/A                    VLAN         : none
Audt Sess ID : 0a0a0a0100018000596dc001
Security Grp : none
IKEv2 Tunnels: 1
IPsec Tunnels: 1
IKEv2:
  Tunnel ID    : 24.1
  UDP Src Port : 4500                   UDP Dst Port : 4500
  Rem Auth Mode: rsaCertificate
  Loc Auth Mode: rsaCertificate
  Encryption   : AES256                 Hashing      : SHA1
  Rekey Int (T): 86400 Seconds          Rekey Left(T): 86379 Seconds
  PRF          : SHA1                   D/H Group    : 2
  Filter Name  :
IPsec:
  Tunnel ID    : 24.2
  Local Addr   : 0.0.0.0/0.0.0.0/0/0
  Remote Addr  : 192.168.50.1/255.255.255.255/0/0
  Encryption   : AES256                 Hashing      : SHA1
  Encapsulation: Tunnel
  Rekey Int (T): 28800 Seconds          Rekey Left(T): 28778 Seconds
  Idle Time Out: 30 Minutes             Idle TO Left : 30 Minutes
  Conn Time Out: 518729 Minutes         Conn TO Left : 518728 Minutes
  Bytes Tx     : 0                      Bytes Rx     : 16947
  Pkts Tx      : 0                      Pkts Rx      : 244

ASA# show crypto ikev2 sa
IKEv2 SAs:
Session-id:24, Status:UP-ACTIVE, IKE count:1, CHILD count:1
Tunnel-id                 Local                Remote     Status         Role
2119549341    10.88.243.108/4500   10.152.206.175/4500      READY    RESPONDER      Encr: AES-
CBC, keysize: 256, Hash: SHA96, DH Grp:2, Auth sign: RSA, Auth verify: RSA
      Life/Active Time: 86400/28 sec
Child sa: local selector  0.0.0.0/0 - 255.255.255.255/65535
          remote selector 192.168.50.1/0 - 192.168.50.1/65535
          ESP spi in/out: 0xbfff64d7/0x76131476
ASA# show crypto ipsec sa
interface: outside
    Crypto map tag: Anyconnect, seq num: 65535, local addr: 10.88.243.108
      local ident (addr/mask/prot/port): (0.0.0.0/0.0.0.0/0/0)
      remote ident (addr/mask/prot/port): (192.168.50.1/255.255.255.255/0/0)
      current_peer: 10.152.206.175, username: Win7_PC.david.com
      dynamic allocated peer ip: 192.168.50.1
      dynamic allocated peer ip(ipv6): 0.0.0.0

      #pkts encaps: 0, #pkts encrypt: 0, #pkts digest: 0
      #pkts decaps: 339, #pkts decrypt: 339, #pkts verify: 339
      #pkts compressed: 0, #pkts decompressed: 0
      #pkts not compressed: 0, #pkts comp failed: 0, #pkts decomp failed: 0
      #pre-frag successes: 0, #pre-frag failures: 0, #fragments created: 0
      #PMTUs sent: 0, #PMTUs rcvd: 0, #decapsulated frgs needing reassembly: 0
      #TFC rcvd: 0, #TFC sent: 0
      #Valid ICMP Errors rcvd: 0, #Invalid ICMP Errors rcvd: 0
      #send errors: 0, #recv errors: 0

      local crypto endpt.: 10.88.243.108/4500, remote crypto endpt.: 10.152.206.175/4500
      path mtu 1496, ipsec overhead 58(44), media mtu 1500
      PMTU time remaining (sec): 0, DF policy: copy-df
      ICMP error validation: disabled, TFC packets: disabled
      current outbound spi: 76131476
      current inbound spi : BFFF64D7
    inbound esp sas:
      spi: 0xBFFF64D7 (3221185751)
         transform: esp-aes-256 esp-sha-hmac no compression
         in use settings ={RA, Tunnel, IKEv2, }
         slot: 0, conn_id: 98304, crypto-map: Anyconnect
         sa timing: remaining key lifetime (sec): 28767
         IV size: 16 bytes
         replay detection support: Y
         Anti replay bitmap:
          0xFFFFFFFF 0xFFFFFFFF
    outbound esp sas:
      spi: 0x76131476 (1980961910)
         transform: esp-aes-256 esp-sha-hmac no compression
         in use settings ={RA, Tunnel, IKEv2, }
         slot: 0, conn_id: 98304, crypto-map: Anyconnect
         sa timing: remaining key lifetime (sec): 28767
         IV size: 16 bytes
         replay detection support: Y
         Anti replay bitmap:
          0x00000000 0x00000001
ASA#show vpn-sessiondb license-summary
---------------------------------------------------------------------------
VPN Licenses and Configured Limits Summary
---------------------------------------------------------------------------
                                     Status : Capacity : Installed :  Limit
                                  -----------------------------------------
AnyConnect Premium               :  ENABLED :       50 :        50 :   NONE
AnyConnect Essentials            : DISABLED :       50 :         0 :   NONE
Other VPN (Available by Default) :  ENABLED :       10 :        10 :   NONE
Shared License Server            : DISABLED
Shared License Participant       : DISABLED
AnyConnect for Mobile            :  ENABLED(Requires Premium or Essentials)
Advanced Endpoint Assessment     :  ENABLED(Requires Premium)
AnyConnect for Cisco VPN Phone   :  ENABLED
VPN-3DES-AES                     :  ENABLED
VPN-DES                          :  ENABLED
---------------------------------------------------------------------------

---------------------------------------------------------------------------
VPN Licenses Usage Summary
---------------------------------------------------------------------------
                          Local : Shared :   All  :   Peak :  Eff.  :
                         In Use : In Use : In Use : In Use :  Limit : Usage
                       ----------------------------------------------------
AnyConnect Premium     :      1 :      0 :      1 :      1 :     50 :    2%
  AnyConnect Client    :                 :      0 :      1          :    0%
    AnyConnect Mobile  :                 :      0 :      0          :    0%
  Clientless VPN       :                 :      0 :      0          :    0%
  Generic IKEv2 Client :                 :      1 :      1          :    2%
Other VPN              :                 :      0 :      0 :     10 :    0%
  Cisco VPN Client     :                 :      0 :      0          :    0%
  L2TP Clients
  Site-to-Site VPN     :                 :      0 :      0          :    0%
---------------------------------------------------------------------------
ASA# show vpn-sessiondb
---------------------------------------------------------------------------
VPN Session Summary
---------------------------------------------------------------------------
                               Active : Cumulative : Peak Concur : Inactive
                             ----------------------------------------------
AnyConnect Client            :      0 :         11 :           1 :        0
  SSL/TLS/DTLS               :      0 :          1 :           1 :        0
  IKEv2 IPsec                :      0 :         10 :           1 :        0
Generic IKEv2 Remote Access  :      1 :         14 :           1
---------------------------------------------------------------------------
Total Active and Inactive    :      1             Total Cumulative :     25
Device Total VPN Capacity    :     50
Device Load                  :     2%
---------------------------------------------------------------------------

---------------------------------------------------------------------------
Tunnels Summary
---------------------------------------------------------------------------
                               Active : Cumulative : Peak Concurrent
                             ----------------------------------------------
IKEv2                        :      1 :         25 :               1
IPsec                        :      1 :         14 :               1
IPsecOverNatT                :      0 :         11 :               1
AnyConnect-Parent            :      0 :         11 :               1
SSL-Tunnel                   :      0 :          1 :               1
DTLS-Tunnel                  :      0 :          1 :               1
---------------------------------------------------------------------------
Totals                       :      2 :         63
```

トラブルシュート

ここでは、設定のトラブルシューティングに使用できる情報を示します。

> **注**：debugcommandsを使用する前に、『デバッグコマンドの重要な情報』を参照してください。

> **注意**:ASAでは、さまざまなデバッグレベルを設定できます。デフォルトでは、レベル 1 が使用されます。デバッグレベルを変更すると、デバッグの冗長性が高くなります。特に実稼働環境では、注意して実行してください。

- **Debug crypto ikev2 protocol 15**
- **Debug crypto ikev2 platform 15**
- **debug crypto ca 255**